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THE SIGHT-SAVING REVIEW

March, 1937

"Let There Be Sight"

Volume VII
Number 1

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What Causes Eyestrain in Children?*

Willis S. Knighton, M.D.

A CLEAR and simple explanation of the common causes of eyestrain in children, indicating the importance of periodic examinations and careful treatment

What Are Normal Eyes?

In any consideration of vision, it is important to remember that, besides being an optical instrument, the human eye is a living organ composed of blood vessels, nerves, muscles and other tissues. All of these parts are subject to the general laws of health. The eye is not an independent organ but rather it is so closely integrated with the body as a whole that it reflects general disease in its own tissues and its function may be impaired. On the other hand, when the eyes are originally at fault, they may set up reflex symptoms that give rise to headaches, dizziness, nausea, indigestion and other general body disturbances. A previous knowledge of general medicine is so important in the treatment of the eye that the American Medical Association requires that every ophthalmologist be a qualified doctor of medicine (M.D.).

One of the commonest misunderstandings about eyes is the general impression that good vision indicates healthy eyes. The child in school is asked to read a chart and if he reads the 20/20 line, which is the accepted standard for normal vision, he is passed as having practically perfect eyes. If he fails to read the 20/20 line, he is usually told that his eyes are not normal and that he needs glasses. Neither statement is necessarily true, however, for the simple reason that no distinction is made in these simple tests between what the eyes can see and how they see it. In other words, if a child has to strain his eyes in order to read the chart,

B.K.J.

* Radio address delivered over Station WOR, February 9, 1937.

his eyes are not normal, even though he reads the so-called normal line.

A child with normal eyes should see clearly in the distance and nearby without any undue effort and without being conscious in any way of his eyes. Eye consciousness means eyestrain of some sort and should be investigated immediately.

Eyestrain may be defined as any extra exertion that is required of the eyes in order to get the best vision of which those eyes are capable. Strain always exists when the eyes are not optically correct because the eyes work automatically and invariably make every effort to see as well as they can.

The three optical faults which induce eyestrain are farsightedness, nearsightedness and astigmatism. Although these can exist in combination, it would be better to consider them separately.

How Farsightedness Causes Fatigue

Farsightedness, or hyperopia, does not mean good vision in the distance. Actually, it means that the eyes have to strain even when they look in the distance, and the more farsighted a child is, the more his eyes must strain. Normal eyes are completely relaxed and rested when they look in the distance because the image of what they are looking at falls directly on the retina (which corresponds to the film in a camera) without any effort of focusing. Normal eyes must focus only when they look at nearby objects, and the muscle which does the focusing is designed to do this near work without any fatigue. In farsighted eyes, however, the image falls too far back even when the eyes are looking in the distance and the retina does not receive a clear-cut picture until the focusing muscle starts working and brings the image up to the retina.

That means that the focusing muscle never gets a rest and for close objects it must work more than in normal eyes.

Little Johnnie, aged 9, was just such a case. At home he was disobedient, irritable and nervous. In school he was called lazy, indifferent and backward. No one suspected that his eyes might be the cause of his trouble because he could always read the smallest line on the test chart, and he was taken from one doctor to another for general examination until finally one suggested a thorough eye examination. Now a "thorough" eye examination

means a complete check of the physical health of the eyes and a determination of the total optical error if any exists. In children, especially, the focusing muscle is so active that it will not permit an exact optical measurement unless it is quieted. Medicine is therefore used to relax the muscle completely and the eyes are measured objectively without the possibility of erroneous answers from the child. Unless this is done, it is not possible to know the total optical error. In Johnnie's case, a large amount of farsightedness was found, and when this was corrected with glasses, his improvement was remarkable. Before he got his glasses, he was straining so much for his ordinary distant vision that when he was asked to apply himself to his books his focusing muscle was too fatigued and he found it much easier to relax by gazing off into space. He was always tired because his focusing muscle was always being overworked. He wasn't really lazy or indifferent, but a fellow can't be expected to be full of pep when some of his muscles are always tired out.

The glasses did the work that the focusing muscles had been forced to do and that left Johnnie with lots of reserve energy. He began to apply himself to his lessons, which were now easy to read, and his whole disposition changed. With his glasses he had become a normal boy.

Why Nearsighted Eyes Become Tired

Myopia, or nearsightedness, is another story. In addition to having defective distant vision, nearsighted eyes are inherently weaker and their supporting structures allow a certain amount of stretching. The more the eyeballs stretch, the more nearsighted they become, so every effort must be made to keep them healthy and strong.

Optically, the eyes are so constructed that distant vision is not clear because the image falls in front of the retina. The focusing muscle cannot help for distant vision because it works only when the image is behind the retina and never when it is in front. With less than normal focusing to do, the eye naturally becomes lazy, and a lazy eye is not a healthy one.

Nearsighted children can see close work very well, and since their distant vision is poor, they naturally prefer to stay in the house

and play with toys or books. The tendency is to hold objects so close that the eyes have to point in or converge excessively and the resultant strain tends to congest and further weaken the eye structures and thus make the nearsightedness worse.

Nearsightedness tends to increase with age but the amount of increase can be controlled to a great extent by proper optical and hygienic care. The most critical period is in the early school life, from the ages of seven to fourteen, and if the nearsightedness is carefully treated during those years, it can usually be held to a minimum. Periodic examinations are necessary to determine the progress of the myopia and to keep the glasses up to the full strength.

Glasses are prescribed for two reasons: a full correction will give the child normal vision for distance, and the focusing muscle will be forced to act in a normal manner. Any correction that is less than full strength fails in both respects. On the other hand, if the glasses are too strong, they force the focusing muscle to overact just as it does in farsightedness, with the inevitable strain. The exact strength of the glass is much more important in nearsightedness than in farsightedness, so it is essential that the child's focusing muscle be relaxed with drops before an intelligent prescription can be given. With this method of procedure, the amount of increase, if any, can be determined exactly at subsequent examinations. Any other method is only a guess.

The glasses should be worn constantly and all close work should be done under the best illumination. If the myopia progresses too rapidly, close work will have to be curtailed. Correct posture is very important to avoid congestion of the blood vessels of the head, neck and eyes. The nearsighted child should learn to sit straight and to stand straight and should never read in awkward positions or with the print too close. That means no funny papers on the library floor.

The tendency to weakened eye structures is best combatted by a robust physique. Sunshine, fresh air, rest and nourishment play just as important a part in the treatment of nearsightedness as do glasses. None of these alone can do the job fully; in combination they give the nearsighted child his best chance for healthy, useful eyes.

What is Astigmatism?

Astigmatism is a word to conjure with. Patients never forget it and they like to blame it for all their troubles. And yet there are very few eyes that have not some astigmatism. The word means "not a point," signifying that images on the retina are not as sharp in outline as a point should be. It is entirely an optical defect of the eyes and in small amounts has no significance. In large amounts, however, the child is conscious of defective eyes and his vision is distorted. Somewhere in between the small normal amount and the obvious large amount is the intermediate astigmatism that is responsible for eyestrain and that is so often unrecognized.

Only when the surfaces of the eye are perfectly spherical is there no astigmatism. Nature seldom makes things so perfect. The eyeball is usually curved a little more in one meridian than it is in another; or the lens of the eye may have unequal curvatures.

The result is that the vertical part of a cross is not in focus at the same time that the horizontal part is, or one diagonal part of the object will seem fuzzy when the opposite diagonal is sharp. The only way for the eye to get any blurred image in focus is to call upon the focusing muscle, and once more we find the child struggling with overactivity of this muscle.

Astigmatism is responsible for many reflex nervous disturbances. About 60 per cent of the headaches that come after close work can be attributed to this source, and in severe, uncorrected cases the child may suffer from dizziness, nausea, vomiting or other systemic reactions. The focusing muscle tries to work in two different directions at the same time to correct the trouble and, although it cannot possibly succeed, it continues to try. Since the vision is not always impaired, the eyes may not be suspected, but once the trouble has been discovered and corrected, the relief is immediate. Glasses are prescribed which bend the rays of light so that all parts of the object are focussed accurately on the retina. Naturally the glasses have to be worn all the time or the symptoms will return.

Not long ago a young boy was given glasses for a rather large amount of astigmatism in each eye. After wearing them for a week he returned to say that they had completely cured him of his

symptoms. He had been suffering from indigestion and regularly had one or two mild convulsions a week. His case was rather dramatic, to be sure, but many other nervous reactions have been found to be due to uncorrected astigmatism, and their cure has been just as effective.

Cross Eyes

Another cause of eyestrain is an imbalance between the two eyes, which often makes the eyes cross. Besides working properly alone, each eye must work well with its fellow, or trouble will result. When an eye becomes crossed or turns out, the vision is often suppressed. But long before any trouble is obvious, there may be a terrific strain which tends to turn the eyes in or out. If discovered early, this tendency can often be corrected with glasses. Fortunately it is always checked carefully by the eye physician. Time does not permit any further discussion of this interesting subject.

Summary

Eyestrain, then, can be relieved. In farsightedness all the symptoms are due to the extra burden that is thrown upon the focusing muscle and when the muscle is relieved by the use of glasses, the symptoms disappear. The farsighted child may see perfectly without glasses, but a competent examination will easily disclose the fact that he is overworking his eyes and that eye fatigue is being reflected in the whole body. The glasses may have to be worn all the time or they may be necessary only occasionally, depending upon the amount of strain present.

Nearsightedness is the result of a weakened and elongated eyeball. Glasses are necessary to improve the vision and to prevent the eyes from being too lazy. The health of the eyeball is of special importance and this is aided by controlling the eye work and building up the general health. Glasses should be worn constantly.

Astigmatism is the result of unequal curvatures of the eye, resulting in a distorted image which the focusing muscle tries in vain to correct. In appreciable amounts the child suffers from

reflex nervous disturbances. Glasses will correct the astigmatism and should be worn constantly.

In every one of these three different types of optical error, a knowledge of the total amount of the error is essential, and this can be obtained only by the use of relaxing drops. Exercise will not take the place of glasses nor are there any other shortcuts to the proper correction of the trouble.

There is no definite period which should be set aside for the first eye examination of any child. The eyes should certainly be examined before a child enters school, and long before that if there is any question about his vision or health. Subsequent examinations will be requested by the eye physician as a result of his findings. A complete examination of the eyes includes a consideration of general health and inspection of external and internal parts of the eye. Parents should never object to the use of drops during examination because they enable the physician to measure the eye exactly, and perhaps to discover an error that was being masked by a fatigued and restless focusing muscle.

The various health tests in schools are doing the young child a world of good in the detection of manifest faults. The vision tests are invaluable, but they should always be supplemented by a complete examination by the eye physician. With a better understanding on the part of the parents, the child will not have to suffer from eyestrain.

Visual Problems in Education*

Lucy V. Ailer, R.N.

PRACTICAL advice based on experience gained as a health supervisor and a county public health nurse

THIS paper is based largely upon experience gained in more than five years' work as health supervisor in a small city school system of about 1,700 pupils, and two years' work as a county public health nurse where, in a general program, some eye work was attempted among the pupils of the county schools.

Lighting Problems

The problems in both localities have been much the same. I should like first to consider the problems which arise from the school buildings and equipment where, all too often, little can be done to remedy conditions. Old buildings must be used as they are, poor conditions being corrected by diverse makeshifts and devices. Many rooms still have cross lighting. Where rooms are arranged so that light comes only from one side, we find too little light on the opposite side of the room unless the upper halves of the window shades are lowered. If the shades are raised to the top of the window, children near the window often are in the bright sunlight, while those across the room have just enough light to do their work. If the shades are lowered, the artificial lights must be turned on, and frequently all are on when the switch is turned.

This problem may be partially solved by use of adjustable window shades or separate shades for each window sash. Buff-colored shades seem best suited and are widely used in school buildings. Electric lighting should be installed on different circuits in a room so that only the section needing more light may have it. It may be

* Presented at the Annual Conference of the National Society for the Prevention of Blindness, Columbus, Ohio, December 4, 1936.

possible to borrow or purchase a light meter to determine what changes should be made in the amount and distribution of light in a given room.

Correct Equipment and Proper Arrangement

Streaks of sunshine, glare and shadows should be controlled as much as possible. Work materials should not have shiny surfaces which give off glare, and type should be large enough to be read with ease. Wall maps and charts also should have a dull finish to avoid glare and should be so placed that they may be seen without eye fatigue.

The seating should be arranged so that the light comes from the left, since most pupils are right-handed; seats and desks should be of such height that a child may be seated properly at his desk. Where the old formal type of seats and desks are used, some improvement may be made by having different sizes. Where space permits, sometimes a diagonal arrangement works to greater advantage than the old formal plan, and, of course, children should not sit facing the light.

In the lower grades, we find pencils with a heavy lead work out better with the little children. Heavy, cream-colored chalk is recommended.

To avoid glare, blackboards should have a dull surface, and writing on the board should be large enough for pupils sitting at the greatest distance from it to see with ease. The use of small pictures held before a class is not deemed good practice, as angles and distance cause too much strain for some of the pupils. The same would hold true of flash cards unless used before small groups seated near the teacher. All equipment should be such that accident hazards are at a minimum.

The school nurse, in her visits to the rooms, may help the teachers by suggesting changes which will benefit a child or a group. She and the teacher have a great opportunity to make a much more pleasant and happy life for many a pupil.

Not infrequently we meet children who are behavior problems in the school as well as at home, and upon inspection they are found to have impaired vision. Often, proper refraction makes quite a different child of the former problem case.

Nearsightedness and Farsightedness

Nearsighted children frequently do not see clearly enough to enjoy playing with others, but do get pleasure from reading. While they do not see the print well, they can bring a book close enough to their eyes to give them reading satisfaction. Because of this condition, they become unsocial. In school, while other pupils are studying charts or are working on the blackboard, these children are unable to see the normal distance and so lose interest. As a consequence, they frequently are the mischief makers. They annoy the other children and the teacher.

The same is true of farsighted children. They get into trouble when close work is to be done because objects which are close are blurred to them. An account of two different children will illustrate:

A child had 20/100 and 20/200 vision, with glasses. He came from a family in which eye defects were inherited from generation to generation. Two of his maternal grandparents were blind—had been for years—his mother has very little vision and one brother was in the State School for the Blind. Another brother had impaired vision but was able with correction to continue in the regular classes. Several cousins were affected similarly.

His mother would not consent to send the boy to the state school and he had too little vision, even with glasses, to attend the sight-saving classes at Mansfield. The oculist recommended the State School for the Blind, and still his mother would not send him. Because of certain circumstances, the boy was permitted to remain in the regular classes until he was about eleven. During these years he became a bad behavior problem and had to be sent about the building on errands to keep him occupied. He fought with the other children, annoyed them in class and tormented his teacher. Finally, through the added efforts of a nurse from the State Commission for the Blind and of the Juvenile Judge, the child was sent to the school for the blind. However, his habits had been formed and, thus far, he has continued to be a problem at the state school.

Another case of low vision with different results was that of a little boy entering the first grade. Upon inspection, it was found that he had only 20/100 vision. His parents were told of the defect and immediately he was taken to the oculist, and, with glasses, he is able to attend a sight-saving class where his parents were happy to send him. The parents in this case were unaware of the child's

defect and appreciated the help received through the school health service. This child is making splendid progress and forming good study habits.

Many of the children who have had vision corrections make a marked advance in their school work. They wear their glasses willingly and take good care of them. When going out on the playground, they often leave their glasses on the teacher's desk. Of course, where marked defects exist, the glasses must be worn, but care is taken not to play games where they may be broken.

Sight-Saving Classes

There are 33 sight-saving classes in Ohio, which "in general, enroll children whose vision is between 20/200 and 20/70, together with children suffering from progressive eye troubles." Sight-saving classes are valuable through giving educational advantages to children with seriously defective vision while saving their sight. Normally sighted children are benefited, since the teacher is relieved of the necessity for devoting a disproportionate amount of time to the handicapped children. The educational system is helped by being relieved of those repeaters who have failed to make their grade because of defective vision. The state benefits from this by investing in children who will thus become an asset rather than a liability to the community. Children whose vision is so low that they must be taught Braille are sent to the State School for the Blind.

There are many schools which have no health service and many others which have the services of a nurse but not of a physician. In Ohio, by law, boards of education may employ a school nurse only when they employ a school physician. Boards with limited funds thus find it difficult to have a health service other than that provided in physical education. If the board of education employs a nurse only, she must be in some capacity other than that of school nurse. Such a nurse working alone in a school system must have the close co-operation of the physicians of the community and of the health commissioner.

It is in this category that I find myself. I have, in addition to the health supervision which entails the routine inspections, the responsibility of the course of study in health, and visiting teacher

and attendance work. Within my five years in Galion, 50 indigent children have had corrections by glasses, three have been assigned to the Ohio State School for the Blind, and one child attends the sight-saving class at Mansfield.

There are two physicians on the board of education, and on their recommendation the board has made a ruling that all indigent cases must be cared for by an oculist, and they have designated the doctor to whom the children are to be taken.

We are very fortunate in being near one of the physician members of the State Commission for the Blind who does all of our work with indigents, making the examinations gratis and charging only the wholesale price for the glasses. He has been the source of inspiration and encouragement in the eye work done.

The Red Cross furnishes the money for physical corrections, which is divided among tonsil, dental and eye cases. The budget allowed is about $600 per year—not a large amount when all defects are considered. The Public Health League, Kiwanis and Rotary Clubs also participate in caring for indigents.

One of the biggest problems is to decide just which children should receive these corrections. Some of the children with the greatest amount of defect, we know, complain the least, while others with only minor defects present more symptoms. Then there are the exceptional children. This group includes the children of inferior and superior mentality; the problem arises as to the correction of the inferior group when the funds are so limited.

All children should have the privilege of being made as nearly normal as possible, and when the inferior group has other handicaps to battle, it seems that they should have vision defects corrected, if possible. However, the members of the group in the upper bracket have possibilities of going far in the world and not only caring for themselves, but also contributing to the well-being of others.

I should like to cite the case of one of our high school graduates of last year. He had his elementary schooling in the sight-saving class at Mansfield, entering the regular classes in junior high school. In his last year this boy entered a state-wide essay contest sponsored by the American Legion and received the honor award, which was a trip to Washington. Had he been deprived of early correc-

tion and special education, he possibly would not have achieved this honor.

Frequently requests for correction come for the mentally inferior group, particularly where families have been cared for by various agencies. If, because of limited finances, the correction is not made, there is sometimes much talk and the idea gains ground that one is discriminating against the family. These cases are difficult, for one cannot say to a family that the child is inferior mentally.

Sometimes, in advising corrections, just the opposite is true. It may be imperative that a child have correction and yet the family will object. Many excuses are offered, from not wanting to accept help to religious beliefs. Occasionally families think it is unnecessary because the child can read, gets along well in school and no one in the family has ever worn glasses.

This discussion has been largely in reference to indigent cases, but families who can well afford to have corrections made often resist. In their cases, similar excuses may be offered. Sometimes the automobile needs immediate repairs and there is not money for both; or the child does not want to wear glasses.

Routine Eye Inspection

As to the inspection itself: each child has the routine school inspection once each year, and for this work there is no ideal place at any of the buildings. In some instances the inspections must be made in the schoolroom where the class is working. All that I can say for this is that it is better than no inspection. However, under such poor conditions, it is remarkable how well the children cooperate when the routine is explained to them and they are asked to continue with their regular work until called upon. The teachers, in these cases, keep the children occupied, and, fortunately, the child being inspected generally is not distracted by the others.

In a more modern building, a music room is used where children are taken separately, and a more satisfactory piece of work is done.

In the visual acuity test, the floor is measured for the twenty-foot distance and chalked. Shorter distances are also chalked for cases of marked defect. The child is seated and the chart is placed

so that the 20/20 line is on a level with the eye. The right eye is tested first, then the left, and the eye not in use is covered with the child's cupped hand.

Charts drawn to the Snellen scale are used—the Symbol E chart for the small children and the letter chart for the older children. Without going into the technique of vision testing further, I wish to state that after the inspections are completed, a record of the group is given to the teacher and the health record of each child is kept by the nurse.

The children having vision defects are seated to their best advantage in order to relieve as much eyestrain as possible. Notes are sent to all parents of children showing defects, and home visits are made in cases where defects are marked and corrections should be made as soon as possible. The parents are urged to consult an oculist. In the case of indigent children for whom the nurse plans the corrections and whom she accompanies to the oculist, the exact condition is understood. This, in turn, is explained to the teacher. I have always found the teachers interested and anxious to help such children in every way possible.

Preschool Examinations

Every spring, after taking the school census, a preschool conference is held at each building where we have a beginning group. All parents are asked to bring their children who will enter school or kindergarten the next autumn. We have two kindergartens; thus many children who are only five are examined each year.

The physicians of the community donate their time for this work. Each child is given a thorough examination and, with the parents' consent, is vaccinated against smallpox and immunized against diphtheria. The visual acuity test is done by the nurse and the parent is immediately told of the results. In this way we strive to have all corrections made before the child enters school. Consideration in indigent cases is given on the same basis as to the children already in school, insofar as it is possible. Of course, we have no way of judging the mental ability of the children except from casual observation, which is indeed a very poor means, in fact, most unsatisfactory.

Common Eye Diseases and Defects

Other than vision defects, eye conditions most commonly seen among our school children are sties, blepharitis, conjunctivitis, and strabismus. Parents do not realize the consequences which may follow any of these conditions. Fortunately, there are very few cases of strabismus and they have generally benefited from glasses. Of three children who should have been operated upon, only one has been thus cared for.

Home treatments for the other conditions are common, and the advice of neighbors or "granny women" is all too often followed, rather than visiting the physician and following his treatment.

Children having conjunctivitis are sent home with a note or taken home and the parent contacted. Sometimes it is necessary to require a note from the physician before re-entering the child, in order to get medical attention for him.

Trachoma and keratitis have never been found among our school children, but if a case should occur, immediate care by an ophthalmologist would be insisted upon.

Foreign bodies in the eye are common and, when easily removed, are cared for at school. In cases where the object is imbedded, the child is sent to the physician.

Children returning to school following illnesses are frequently not yet built up to their normal strength and should be given eye care as well as general care. Occasionally, vision defects result from illness, particularly where the kidneys have been involved. An observing teacher will report such children if they have always had normal vision but complain of symptoms or appear to have eyestrain, and a visual acuity test should be given.

Safety Measures in School

One of the most serious problems is that of accidents. All precautions should be taken, as mentioned previously, in having equipment which is free from the possibility of accidents. Classes in safety should really be campaigns for prevention; they should promote an interest in games which are safe and a desire in the children to play them. Children should be taught to protect each other on their way to and from school and they should be directed in their play at school. They should not be permitted to throw

sharp missiles or run with sharp sticks. Firecrackers, toy pistols and knives should be prohibited.

Recently we had a minor accident which might easily have been quite serious. It occurred during the noon hour, when some of the smaller boys were enjoying a ball game. One of the boys was running to catch the ball, and, of course, kept watching it. In so doing, he ran into a fence and cut a small gash in the supra-orbital arch. It might easily have extended into his eye.

Similarly, a very serious accident did occur several years ago to a preschool child. A little boy ran into a fence from which a nail projected. It was at just the right height to puncture the eyeball. Although the little fellow had good care, his parents would not accept the advice of the ophthalmologist to enucleate the eyeball, and sympathetic ophthalmia resulted in the other eye, with loss of vision. The child is now in the Ohio State School for the Blind.

Not long ago a preschool child with a traumatic cataract was brought into the ophthalmologist's office. A year ago he was snapped in the eye with a rubber band, which probably caused uveitis. The parents did not notice any abnormality until the cataract became apparent. This probably is another case where it was thought foolish to consult a physician or specialist for the initial injury.

Machinery in school shops should have the same safety devices as similar machinery in industry, and students should understand how to use their tools before being put to work. They should not be permitted to work after school hours unless a supervisor is present. The same hazards exist here as in industries using similar machinery and tools, and immature workmen will take greater risks than the older men in shops. Laboratories should also be closed to pupils unless a teacher is present, and this applies to the home economics department as well as to chemistry, physics, and biology laboratories.

Not in every community are school authorities fully awake to the hazards and needs of visual care. Sometimes a personal experience helps to emphasize this aspect of school hygiene. My superintendent once had an eye burned very badly in a laboratory explosion and consequently was under treatment for nine months, with good results. Needless to say, he is anxious for every precaution to be

taken for the safety of our pupils and to have every care possible for their eyes.

Summary

Nurses working alone in communities will find help, advice and encouragement in various service clubs and interested groups within their communities, and particularly within their state in the departments of health, education and the Commission for the Blind. Much valuable material may be secured from the National Society for the Prevention of Blindness. By concerted effort on the part of all workers within the schools, surely the sight of the school children should be conserved and eye problems in education be more easily solved.

Study Facilities in College Dormitories

John O. Kraehenbuehl, Ph.D.

AN interpretation of a survey which was made of lighting conditions in the dormitory rooms of more than 2300 students; suggestions for improvements are made

THE study facilities in college dormitories or in rooming houses used by students are not adequate, nor conducive to prolonged and concentrated study. A survey of over 2300 student study surfaces shows that the illumination is such as to cause severe eyestrain which, in the normal college period of four years, may produce permanent disability. The education of the student and of the administration has been difficult in the past, for there have been so many conflicting data from various researches that the whole question of proper illumination and the amount of illumination needed has been championed by individual groups, each classed as experts, but of so little accord that the layman knew not which way to turn for information. In recent years much has been added to the knowledge of seeing, and the final test has been the satisfaction experienced by the individual who has had an opportunity to follow correct principles. When a person who has had occasion to use artificial illumination for a great portion of his work uses a surface lighted under the direction of one qualified to analyze the problem, he finds relief from eyestrain, a large reserve of nervous energy after a strenuous task, and rejects enthusiastically all the former methods: then, there is evidence of the worth of the installation. Having seen numerous students and administrators become enthusiastic exponents of the principles of good lighting, the author feels that correct information is available and that the time is here for intensive education among both the student body and the college administration. For those who attempt to carry the work forward there are many disappointments,

for, even when the idea is accepted, often there are miscarriages when the principles are applied, not through intent but through ignorance of the fundamentals.

Education and Demonstration

The principles of good illumination may reach the students through lectures and demonstrations or the actual use of well lighted study facilities. The illumination of a reading room using proper arrangement, quantity and quality of light is an easy way to acquaint the whole student group with the principles of good lighting; and placards advising the student as to how his or her study surface may be made as pleasant for work will form a direct appeal for the correction of a much neglected asset to comfortable study. Where one room lighted in this manner has been installed, there has followed such a demand for similar lighting in other reading rooms and classrooms that the administration has found itself facing a problem which it lacks funds to solve.

The student will neglect his eyes even when told by the health service that correction is necessary. Sometimes, when the co-operation of the parents is requested, the problem of the needed correction is solved. It is necessary to impress the student with the fact that, regardless of how perfect the illumination may be, no amount of arrangement or illumination will take the place of proper eye correction. In survey work it is frequently evident, when talking with the student, that a high illumination, which is unnecessary, is used in an attempt to make up a deficiency of the eyes.

The student does not analyze the economics of adequate illumination with the proper insight. When he is able to purchase a study lamp with inferior lighting characteristics for one dollar or less, he will not purchase a more expensive type without having the fact that the first is poor economy clearly analyzed. When shown that the investment is for four years, that the cost per year is very slight, and that eye correction and the loss of only a short time from his work are very expensive (based on his cost per day at school), he is the first to turn toward better study facilities. At present, the nearest approach to a perfect study lamp is totally indirect lighting equipment, which, for the proper quantity of illumination, is so expensive to operate that in most college dormi-

tories and rooming houses it must be ruled out. The Illuminating Engineering Society, after making an investigation of study surface lighting, has developed what is commonly known as the I. E. S. Study Lamp, which, though not perfect, attempts to combine proper illumination with economy of operation. The use of these lamp specifications has been licensed to reliable manufacturers, and the product is checked by laboratory test. Improper use of the best equipment may produce results as definitely injurious as the inferior grades of lamps used by the student.

Principles of Good Lighting

These fundamentals must be definitely understood and practiced by the student and advised by the administration if the resultant lighting of the study surface is to be effective and comfortable. The important items are listed below:

1. Amount of illumination in foot-candles. It has been found that 15 foot-candles on the work is very comfortable, if controlled.
2. There must be no glare, either direct or indirect. The first is accomplished by shading properly and the latter, by eliminating shining surfaces and reducing the source of brightness.
3. Illumination of the surroundings with a desk and lamp arrangement which permits of an adjustment to remove reflected glare. The surroundings should be illuminated to about 20 per cent of the average illumination on the work surface, and the desk should be, for a single individual, approximately 30 by 48 inches in size. The lamp should also be weighted for stability.

Many other items, such as heating, ventilation and size of room, enter into the problem of study facilities, but this paper will be confined to the one item of illumination.

With the student, the problem is one of education and demonstration, but with the administration, there must be an analysis not of the individual problem but of the group problem, which is best approached through a survey of the study facilities.

Survey of Student Study Surface Illumination

Organization.—As in other surveys, the important factor is organization, for, besides having a trained personnel, it is necessary to establish the objectives, and to have proper equipment and specifications so that various survey groups will not introduce personal errors into the data. Figure 1 shows a survey kit developed for making a survey of lighting equipment used by students for study. The foot-candle meter shown is a medium priced meter and could

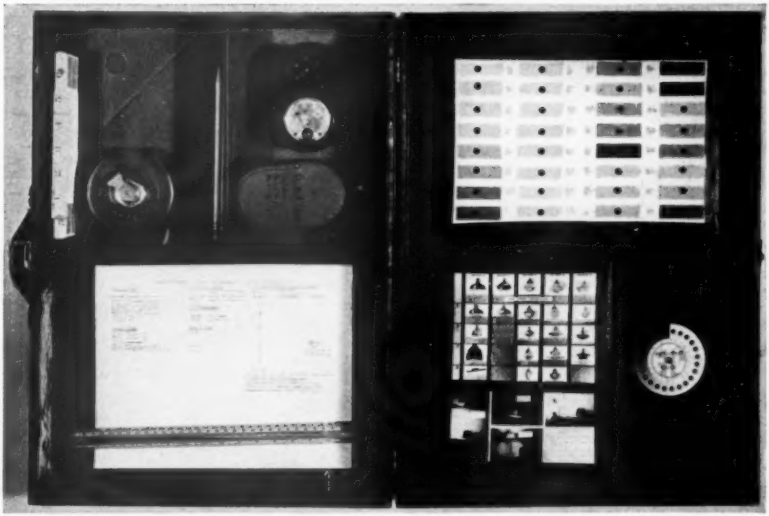


Figure 1.—Survey Kit. Foot-candle meter, 50 foot tape, 6 foot rule, triangle, pencils, survey forms, scale, color chart, equipment chart, reflection gauge.

be replaced with one costing about half as much, with equally accurate results. Besides this one important item, there are charts showing the classification of both room and desk lighting equipment, and color charts for the classification of room coloring. A reflection coefficient indicator is shown, but these reflection factors may be obtained by use of the foot-candle meter with a higher degree of accuracy. Scales, rules, tapes, straightedges and survey forms are added for keeping records and measuring the room and desk dimensions. Training of the survey groups, where a squad of

Illumination Survey in Study Room 365 Wright Street

Lamps in Room

Number 3
Size Watts 25, 25, 40
Condition G, G, G
Location desk (R) center dresser
Mounting Height 10"
(Desk level to filament)

Plan of Room

Length 12 ft.
Width 11 ft.
Height 8 ft.
Floor Area 132 sq. ft.
Watts per sq. ft. 0.67

Reflection Factor

	Color	Coefficient
Ceiling	18	4v
Walls	18	4v

Desk Dimensions

Length 40" in.
Width 25" in.

Type of Unit

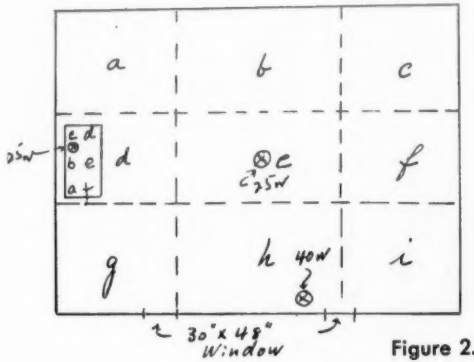
Desk- Class B

Room- Class E - Center has no shade Dresser has yellow parchment shade

Horizontal Illumination of Work in Room

Location	Desk Height	On Desk
a	1	3
b	1	12
c	1	38
d	3	32
e	2	12
f	1	13
g	1	24
h	2	124
i	4	177
j	9	16
k		174
l		
m		
n		
o		
p		

Range on Work
Max. 90
Min. 15



Average Illumination in plane of reading fte. 30
Is Desk Surface Glossy? no
Does it Reflect Light Source? no
Illumination on Surface Faced 1
Remarks** Are Glasses Worn? yes

Single room light floor

Signature L. R. Rogers.

Figure 2.—Survey Form.

two observers proves the most satisfactory size, is best accomplished by practice in the field under the supervision of an experienced individual.

Survey Forms.—The survey form shown in Figure 2 is a modification of the one used by the Illuminating Engineering Society Committee in its original survey conducted by members located at colleges throughout the United States. The form shown includes studies of the desk location and the windows. In the tables given summarizing this survey, no mention has been made of daylight illumination, for most students study at night in their rooms, using

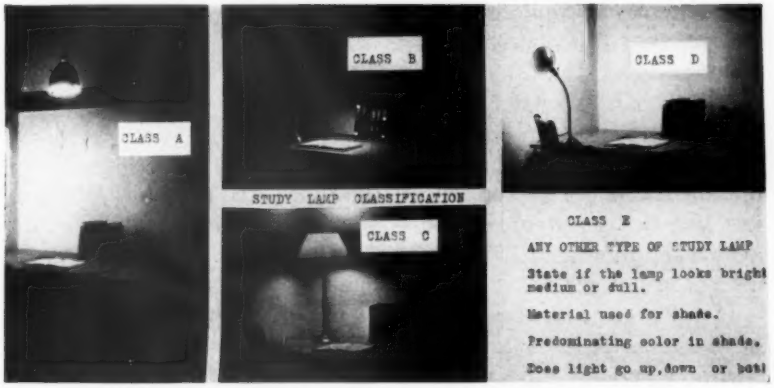


Figure 3.—Student Study Lighting Equipment Classification Chart.

libraries and classrooms for the greater part of the day. The data from the survey forms are tabulated on composite forms which allow rapid retabulation of the various items of interest into summaries. A preliminary survey established the desired survey form and the necessity for making a study of the lighting equipment in general use by the students. The survey was a means of disseminating information to the students concerning proper lighting and bringing attention to the defects of installations being used. An investigation was made of the lighting equipment in general use, and a qualitative rating was given each specific piece of equipment.

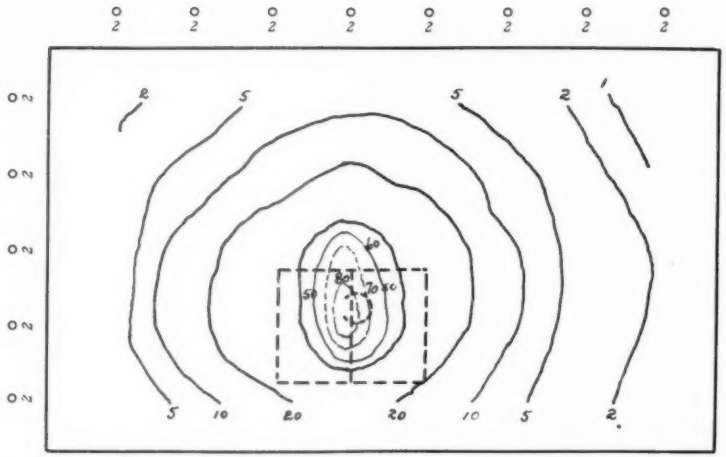
Types of Lamps.—Figure 3 shows the types of lamps in general use by the student. Class B, the goose-neck lamp, was all too

common. Class D was developed by following suggestions to students in lectures that, using a drop light and a goose-neck lamp with a reflector, would give a much improved lighting for study purposes. Class D fulfills many of the I. E. S. specifications but is more expensive to operate. The high percentage of this type of equipment shown in the tables is directly due to educational influence. Class A is a drop light which has some good points, and under Class E can be classified all types of decorative and freak lamps, which are in one class as to general worth. In some instances students were working with bare lamps covered with theme paper or located at such an angle as to eliminate direct glare.

Evaluation of Equipment.—To present an argument concerning the different types of equipment, it is necessary to develop some concrete basis of comparison. The statement that one lamp is better than another may lead only to a difference of opinion, and not until the two are compared in the light of definite weighted values for desirable and undesirable characteristics is it possible to present a strong argument. Since the types used by the student are few and the requirements for a good study lamp are specific, an evaluation of student lighting equipment is restricted to a narrow field of investigation.

If a point or numerical evaluation can be given to: (1) quantity of illumination; (2) uniformity of illumination; (3) glare; (4) shadow; and (5) ratio of general to work surface illumination, a coefficient may be obtained which represents the position of the equipment in a relative scale of merit. Items 1, 2, and 5 may be obtained by an investigation of the lux plot for the study and text surfaces; items 3 and 4 must be obtained by some arbitrary standard of comparison. These last two were evaluated by using a mirror for glare determination and a stick perpendicular to a test surface for the determination of the character of shadows. Glare may be interpreted in terms of brightness or candle-power per square inch.

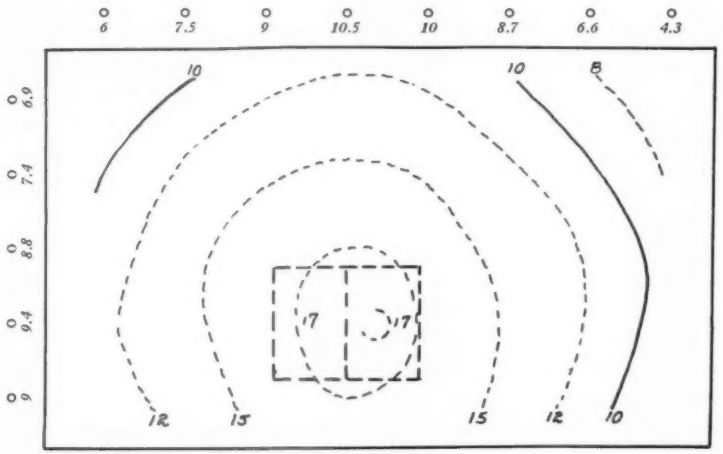
The lux plots for the various types of equipment are shown in Figures 4, 5, 6, and 7. The isolux lines show the regions of equal foot-candles while the small circles indicate readings taken on the wall at eye level. The table was placed in the corner of the room,



	Desk	Wall	Book	
Max.	85.0	2	160	Distance of Lamp above Surface
Min.	1.0	2	40	11 inches
Avg.	14.1	2	85	25 watt
Range	84.0	2	120	

All measurements in foot-candles

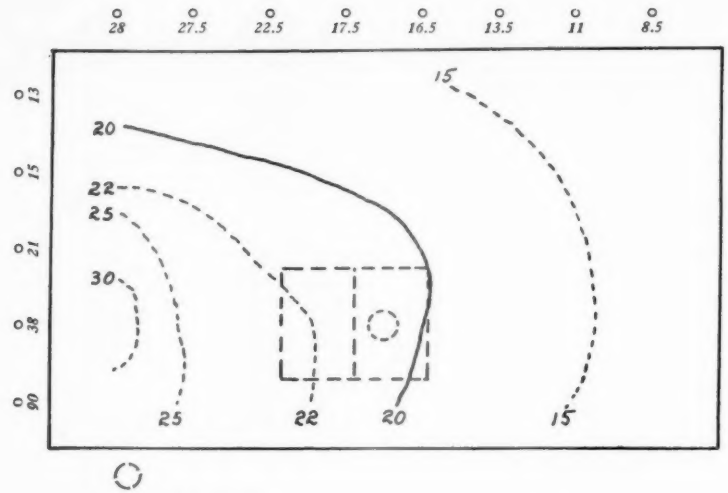
Figure 4.—Isolux Diagram for the Light Distribution of a Goose-neck Lamp.



	Desk	Wall	Book	
Max.	17.0	10.5	17.8	Distance of Lamp above Surface
Min.	7.8	4.3	16.5	45 inches Tracing-Cloth Screen
Avg.	10.6	8.0	17.2	100 watt
Range	9.2	6.2	1.3	

All measurements in foot-candles

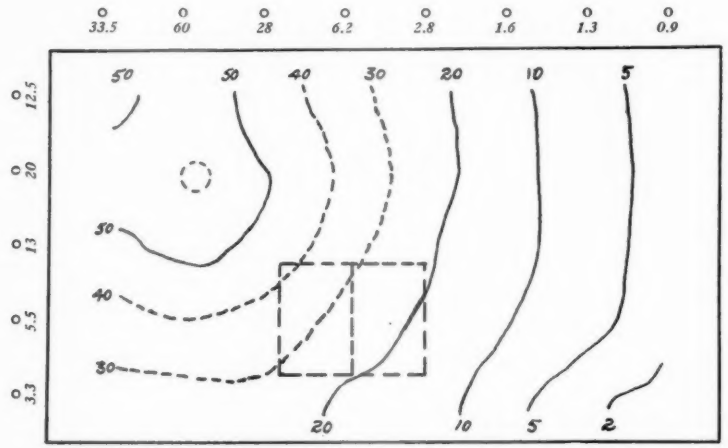
Figure 5.—Isolux Diagram for the Light Distribution of a Drop Light.



	Desk	Wall	Book	
Max.	31.5	90.0	22.4	Distance of Lamp above Surface
Min.	11.0	8.5	19.8	Top Lamp 45 inches, 75 watt
Avg.	18.8	24.8	21.1	Side Lamp 20 inches, 100 watt
Range	20.5	81.5	2.6	

All measurements in foot-candles

Figure 6.—Isolux Diagram for the Light Distribution of a Drop Light and Reflector.



	Desk	Wall	Book	
Max.	58.0	33.5	37.0	Distance of Lamp above Surface
Min.	1.8	0.9	15.5	25½ inches
Avg.	24.5	14.5	25.6	100 watt
Range	56.2	32.6	21.5	

All measurements in foot-candles

Figure 7.—Isolux Diagram for the Light Distribution of an I. E. S. Lamp.

since most student rooms follow this arrangement, but when the desk was placed along the side wall of the room, the significant readings were not altered. The figures include a tabulation of the maximum, minimum, and average of the foot-candles as well as the range on the desk, side wall and the text.

Table 1

RATING OF STUDY LAMP EQUIPMENT

	Size of Lamp in Watts	Quantity of Illumination	Uniformity of Illumination	Glare	Shadow	Ratio of General to Work Surface Illumination	Total Points	Rating
Goose-neck Desk Lamp.	25	3.7	2.7	1.0	1.0	1.0	9.4	D−
Drop Light (Tracing Cloth)....	100	1.7	4.7	3.0	1.0	4.0	14.4	C−
Goose-neck Lamp (Reflector)...	100	0.0	4.3	5.0	3.0	4.0	16.3	C+
Goose-neck Lamp Drop Light (Reflector and Tracing Cloth)....	200	2.7	4.7	3.0	3.0	5.0	18.4	B−
I. E. S. Lamp (Desk in Corner)...	100	4.0	3.0	3.0	2.0	5.0	17.0	C+
500 Watt Indirect Lamp..	500	5.0	5.0	5.0	5.0	5.0	25.0	A

A = Excellent. C = Fair.
B = Good. D = Poor.

Table 1 gives the rating (in points) for the various types of equipment. This enables the survey squad to point to the defects or merits of the lighting equipment when consulted by the student. The survey, in this manner, besides making available much useful information for presentation to the administration, likewise acted as a school for presenting to the student the factors involved in the illumination.

Tables 2, 3, and 4 give a summary of some of the important findings of the survey and a comparison of the lighting in some dormitory rooms which were changed after results of the survey were available. In Table 2, the distribution of the various types of equipment is shown: the men selected the goose-neck lamp, the women all types of decorative silk shades (which were low in quantity and poor in quality of illumination), and nearly 4 per cent of the student group used bare lamps. The survey shows that 95.3 per cent of the lighting equipment is poor and 4.7 per cent rated

Table 2

DISTRIBUTION OF TYPES OF STUDENT STUDY LIGHTING EQUIPMENT BY PER CENT

(Classification according to Figure 3)

Type	Women			Total	Men			Total
	Sor.	Res.	Ind.		Frat.	Ind.	Total	
A	..	..	..	..	..	4.84	2.00	1.05
B	29.72	35.90	36.79	34.02	91.58	81.04	87.22	62.12
C	..	1.19	0.52	0.54	0.41	3.10	1.52	1.05
D	..	..	0.52	0.18	3.80	5.99	4.71	2.57
E	62.97	61.72	49.74	58.04	3.80	3.29	3.59	29.29
None	7.31	1.19	12.43	7.32	0.41	1.74	0.96	3.92

2373 positions studied
(A, C, D) 111 positions good and satisfactory—4.7%
(C) 25 positions satisfactory—1.1%
(E, B, None) 2262 positions poor—95.3%

as good. At that time, only 1.1 per cent of the students used I. E. S. specified lamps, but at present there are about 20 per cent of the students equipped with this type of lamp, following a lighting campaign inaugurated by the student paper.

Other Equipment.—Table 3 lists other requirements besides the lighting equipment. The students are confined to the use of very small work surfaces in the nature of small tables, often of the kitchen table type, so that, even with the best equipment, it is impossible to place the lamp in such a position that there will be no glare from the glazed paper usually used in book making. Even worse, in many instances two students were using one desk, making

it impossible to adjust the lamp in the best position for either in the confined limits of the surface. Table 3 is self-explanatory. The desired listing, which was determined from research in the laboratories or from investigations by those interested in the problem of illumination for proper seeing conditions, is directly compared with the reported per cent of satisfactory study positions. Unfortu-

Table 3

ANALYSIS OF STUDENT STUDY LIGHTING

Detail	Desired	Reported Satisfactory
Size of Study Surface	32″ x 54″	5.5%
Type of Study Surface	Dull	83.2%
Study Surface Reflection	No Specular Image	74.3%
Type of Lighting Unit (Figure 3, B)	A, C, or D	4.7%
Mounting Height of Lamp Filament	25 ± 1″	4.6%
Average Foot-candles on Work Surface	15	64.1%
Average Foot-candles on Surface Faced	5	40.1%
Average Foot-candles on Text Book	25	43.6%
	40%	42.0%
Glasses Worn by Students	College Students	
	Defective	Corrected
Size of Incandescent Lamps	100 Watt	1.8%
Watts per Student	100 Watt+	26.9%
Watts per Square Foot	1.5+	13.7%
Reflection Coefficient (Ceiling)	80%	8.7%
Reflection Coefficient (Sidewall)	50%	94.5%

nately, though the percentages indicated that there should be a reasonable number of properly arranged and lighted study positions, where one condition was met, others were neglected, and in the whole survey not a single position could be considered ideal.

Table 4 is a study of a series of dormitory rooms before and after the arrangement of the room had been changed and I. E. S. specified lamps had been installed. There were many features neglected in this installation, not by intent on the part of the administration but because of an incomplete comprehension of the

problem involved. In this instance, the lighting was very much improved. Whereas the students had continually complained to the matron in previous years, there were no such complaints during the first year of operation.

Table 4

COMPARISON OF DORMITORY STUDENT STUDY SURFACE LIGHTING BEFORE AND AFTER LIGHTING CHANGE

Selected Number of Rooms Reduced to Unit Base

Items	Before	After
Number of Lamps	2.5	1
Average Watts	112.5	150
Height of Lamp Filament	12.2″	25″
Watts per Square Foot	0.93	1.28
Size of Work Surface	24″ x 38″	30″ x 48″
Type of Study Lamp	Various	c
Average Foot-candles in Room	3	6
Average Foot-candles on Desk	19	20.5
Average Foot-candles on Text	15	22
Average Foot-candles on Surface Faced	2.8	4

Responsibility of the Administration

When the study of lighting conditions and equipment has been investigated by responsible organizations—and this can be accomplished under the direct supervision of the administration itself—the administration has the problem of educating the student to the proper use of lighting equipment and of supplying such equipment in the dormitories or making it available for the rooming houses. The administration is the only organization that can enforce the use of proper lighting for study since it holds the responsibility of the dormitory and, likewise, is the enforcing power in the students' contracts with the rooming houses. Several schools have been recognizing the responsibility of this phase of the students' educational requirements even more than their responsibility in classroom lighting.

The attitude of some colleges taking the lead in the improvement of student study surface illumination is best expressed in quotations from their regulations:

"Because of the importance of good lighting for study purposes, the University requires that all study places for students in private rooming houses and fraternity or sorority houses be furnished with lighting equipment meeting the approval of the University authorities. Lighting equipment such as the 'Better Sight Reading Lamp,' whose specifications are approved by the Illuminating Engineering Society, or equivalent is required. Students living at home are expected to safeguard their vision by the use of proper equipment."*

"Each man, if he desires, is entitled to 100 watts of electric light. Tenants wishing to use I. E. S. lights must furnish lamp complete."†

These two quotations will serve to show that administrations will co-operate in the problem of student study lighting if the problem is presented to them, because educators recognize the fact that approximately 80 per cent of all learning is acquired through the eyes. The protection of the eye and the release of wasted nervous energy because of the elimination of eyestrain make for study, and this increases the usefulness of the college period in the development of viewpoint and the accumulation of specific knowledge for professional use in later life.

Summary

The improvement of the student study surface lighting and the parallel requirements for the use of proper lighting equipment may be listed under four heads:

1. An educational program, which includes both the administration and the student body, on the proper lighting requirements and the loss of nervous energy through improper attention to the requirements of the eyes.
2. The accumulation of data on the equipment that is being used and a survey of the conditions under which the student is working.
3. The furnishing of good lighting equipment by the administration in the dormitories that it operates.
4. The passing of regulations by the administration which will govern the student in rooming houses, fraternities or sororities where the lighting equipment is not a part of the college physical plant.

* *Marquette Student Handbook.* Marquette University, Milwaukee.

† *University of Illinois Lodging House Agreement.* University of Illinois, Urbana.

Each part of this program has its place in the complete problem, and the neglect of one item will necessarily weaken the results that are obtained. The greater portion of the faculty and the administration understand as little as the student the requirements for good study lighting. For this reason, the starting point is an educational program for which the stage has been set by commercial advertisement, making the people conscious of the necessity for more and better light. If this educational movement is not inaugurated at a very early date, there will be much damage done by the five-day lighting specialist, who preaches good lighting with a foot-candle meter and marks his results on an increased watt-hour consumption sheet which is the gauge for promotion and salary.

Social Interrelationships in Sight Conservation*

Lena R. Waters

THE importance of translating the scientific discoveries of today into tools which can be used efficiently in programs for disease prevention is stressed. The author also indicates that medical social workers have a unique opportunity to render valuable help in such programs

WE are gathered here because of our mutual interest in preventing blindness. I bring you no new thought, but will hope through a review of my conception of the scheme of life to stimulate the thought that is already yours, and to reinforce my own faith in all that seems worthwhile.

In any discussion of prevention of disease in people, one must of necessity consider the individual and all that concerns him. One considers the influences of the past and of the present and the goal to be attained. What is it that one seeks in life? Is it contentment? Is it happiness? Are the two terms synonymous? What are the ingredients for a satisfying life and how are they attained? The answer differs for each one. Individuals are not standardized—therefore, relationship between individuals continues interesting. The requirements for personal satisfaction vary with each generation and differ as our heredity and environmental influences differ.

Dr. Richard C. Cabot of Harvard University tells us in one of his stimulating publications that the ingredients for successful living are opportunities for "work, play, love and worship." Dr. Austin F. Riggs in his book, *Intelligent Living*, states that we are most likely to be happy if we can achieve a balanced life, and that to

* Presented at the Annual Meeting of the National Society for the Prevention of Blindness, New York City, December 11, 1936.

achieve this balanced life there should be included opportunities "for work, play, rest, leisure, contemplation, and last but not least, physical fitness."

Hendrik Willem Van Loon, in his *To Have or To Be—Take Your Choice*, says that the purpose of life is to achieve happiness, and he states "that man (woman or child) is happy who is able to play the rôle which satisfies him most completely in his own eyes." Perhaps I mean the same thing when I say that happiness depends upon our continued ability to participate in the molding of life, the opportunity to struggle, to increase strength through success over obstacles, for each success brings with it new strength, new knowledge and, therefore, new obstacles in the form of higher goals, standards, ideals.

All progress is struggle. The revolutions of the past and the revolutions of the present are the labor pains of a new development—a new step forward in civilization. Our forefathers gave us the impetus and surrounded us with the opportunities to continue to march forward.

In a few short years we have witnessed the miracle-like changes due to the inventions and discoveries of modern science and industry. These discoveries have not been possible except through knowledge of the efforts of the past and painstaking and ceaseless struggles to tear apart the curtain dividing cause and effect. Benjamin Franklin gave us electricity and Edison spread its use. Alexander Graham Bell gave us the telephone, and Marconi, wireless telegraphy. Dr. George R. Minot gave us liver therapy. Dr. Charles H. Best and Dr. Frederick G. Banting gave us insulin. Dr. Credé of Belgium taught us the relationship between gonorrheal infection and ophthalmia neonatorum and educated us in the use of the tiny and effective drops of silver nitrate.

There would have been little value in these discoveries by the great scientists, however, had they not been made available for use. Their use was dependent upon the education of individuals and groups of individuals in their use, and to available resources within the reach of the consuming public. We, each of us, seize upon and use those resources which we believe will speed us toward our selected goal and we discard the use of those which have no meaning for us.

The most universally accepted goal sought by man throughout the ages has been an opportunity for sound mental and physical health in order that he may be free to live life. Since the beginning of time he has sought health. We have seen the science of medicine struggle from the stages of superstitions and witchcraft, through the study of mind and matter, up to its present high place of achievement. We have seen medicine carry with it improved individual and community health. We have been taught the relationship and the interdependency between social living and sound health. We have seen scientific medicine accepted not merely as an individual matter, but as a responsibility of society as a whole. Great institutions of medical learning have been encouraged and supported through philanthropy and tax funds. Through the public support of scientific medicine, great strides have been made in the organization and development of state, county and city departments of public health. Science has taught us preventive medicine and is joining hands with the public in making it available for use by each and all of us.

There has never been a time in the history of mankind when the opportunity for a satisfying life for each of us was greater. Space has been eliminated, hand labor has been reduced to a minimum, and many devastating diseases are under control. Yet we continue to have poverty and illness, and millions of people are permanently handicapped through preventable diseases.

The development of resources for a wider spread of education in measures for prevention must be continued and must swing from the speed and rush and complicated organization of the great cities to the isolated and primitive life of remote rural areas. The services of prevention and treatment cannot be limited to any one group of society. They relate to the whole. The rearing and education of the children of the poor do not essentially differ from the educational needs of the children of well-to-do parents. Disease knows no class distinction and strikes alike the colored and the white, the rich and the poor.

Medical social workers, more than many others, have a unique opportunity to render valuable help in programs for disease prevention. The use of hospitals and clinics is increasing in flood-like volume. In 1873 there were, in the United States, 149 hos-

pitals containing 35,000 beds. In 1931, the American Medical Association registered 6,613 hospitals with 974,115 beds. In 1900, about 114 years after the first dispensary was organized, there were 100 dispensaries in the United States. Between 1910 and 1930 the number of clinics had rapid growth, and today there are approximately 6,000 clinics in the United States, with a record of approximately 30,000,000 visits annually. To these clinics come all ages, races, and types of people, with every known disease. Day after day, hospital workers observe the tragic results of unused opportunities for prevention. Medical social workers are aware of the relationship between diseases. They are taught the influence of diabetes, tuberculosis, syphilis, and malnutrition on eye diseases. They know the folly of attempting treatment of a part without treatment of the whole. They know that an infectious disease in one member of a family is a warning signal of possible infection in other members. The infected eyes of the newborn babe point to the necessity of examination of his mother and his father, his brother and his sister. One is shocked by the findings of such studies as *Maternal Mortality in Philadelphia*, by Philip F. Williams, M.D., and the study of *Chronic Illness in New York City*, by Mary C. Jarrett; by the findings of the American Social Hygiene Association; and by the figures and reports presented by the National Society for the Prevention of Blindness.

One wonders why people are ignorant and indifferent. Why do they not co-operate? Why do we have to have so much follow-up to insist that people take measures for their own health and happiness? Is it because we ourselves are ignorant? Are we satisfied to follow-up rather than to lead? Does the patient understand the meaning of his disease and his part in treatment? The law of self-preservation and not perverseness makes one resist that which one does not understand. How wise are any of us when faced with a new experience? In any situation we react in the light of our past experience, and our future attitudes are modified by the new experience through which we are passing.

Studies have been made in hospitals, from time to time, on this question of follow-up of patients. You are familiar with the studies which have been made on follow-up in cases of glaucoma and other eye diseases. An interesting study was made in 1930 under the

supervision of Miss Louise A. Brown of the Department of Social Service of the Hospital of the University of Pennsylvania, and published in the *American Journal of Syphilis*, October, 1930. The objective of this study was to learn the reasons for the patient's failure to continue his treatment. The returns were embarrassing. We learned that "financial difficulties, unsuitability of hours, shortcomings of the clinic personnel in establishing rapport and educating its patients, and painful or incommoding reactions to treatment, are, in varying proportions, depending on the method of analysis, the overwhelmingly prevalent causes for the failure of patients with syphilis to continue under treatment until discharged." We learned that 85 per cent of the reasons for lapse are capable, to some degree, of adjustment.

In the efforts to develop wholesale methods for treating wholesale problems, the strength to be preserved and built upon in the individual units of society must not be overlooked. After all, who has greater concern for his own welfare than the individual himself?

Those of us in the medical world have long since learned that treatment cannot be imposed on a patient. Treatment is a partnership business and the patient is a very important partner without whose co-operation little in the way of successful treatment can be expected. In a profitable partnership each must seek to understand the contribution which each is prepared to make. There must be mutual respect, which implies a give and take between two personalities, with an appreciation of the right of each to his own attitude.

The problems with which a patient is faced are many and varied. The entanglements of poverty, fears, unhappy homes, the superstitions of ignorance, lack of educational opportunities or of personal resource to meet the exceptional need—these, and many others, are faced by individuals when overcome by disease. The medical social worker must include in her particular equipment, not only an understanding of the sick person and all that concerns him, but a knowledge and skill in the use of community resources. She shares her information with the patient and helps him to select out of the resources those which will meet his special need. Through the medical social worker, the hospital and other community agencies are closely allied in the program for health, learning from

each other, pooling their resources, and truly co-operating for the benefit of the individual patient and for society as a whole.

A case which illustrates one of the problems not infrequently seen in a department of social service is that of a three-year-old colored child:

"The patient, the older of two children, is on Ward 0, with interstitial keratitis probably due to congenital syphilis. Following her previous hospitalization for phlyctenular conjunctivitis she returned home, but her condition became worse and she was re-admitted. While on the Ward, the eye condition rapidly improved. A good hygienic program and adequate diet with limitation of sugars, together with regular treatment for lues in the Dermatology Clinic, comprise the suggested treatment. Mother, age 21, said to be unsystematic in her care of the children because of employment outside the home, is unable to carry out instructions. Patient and her sister are cared for partly by stepfather and by maternal grandparents who are well meaning but ignorant. Patient's diet has been devoid of vegetables and fruits. Parents are confused as to child's medical condition and suggested treatment."

The question faced by the patient's mother is whether she shall continue her independence by day's work which takes her away from her family, or whether her greater responsibility is to her children. She decided for the latter, and was directed by the social worker to a relief agency which very willingly gave her sufficient relief to maintain her home and to give the personal care which her children so much needed. It became necessary in this case to examine and treat this mother for syphilis and, through her, to bring in for examination and treatment the unmarried father of her children. This group was entirely co-operative, but from time to time aid, through the direction of the visiting nurse, through supplementary aid of glasses, and supplementary financial help at times of acute illness, was required. The mother worked out her own and her children's problems, but in doing so she needed and was given the help of a group of community resources with which she had not formerly been familiar.

Growth comes through individual effort and through group effort. They are interdependent. Groups create opportunity and point the way. The individual himself will use these opportunities to the degree to which he understands their relationship to

his own situation. My concern is that each patient or potential patient may himself have a share as an active partner in this campaign for prevention.

The interrelation between one's social living and disease is obvious. Measures for preventing disease include consideration of all that concerns an individual. There seems to be no other field for prevention in which this interrelationship is more strikingly seen than in the field of prevention of blindness; for instance, prenatal health, safety in recreation, individualized opportunities in schools, lighting in industry, control of infectious diseases and, above all, a healthy home with informed individuals who will know how to use the resources for education and health which have been provided for them.

The goal of man is freedom, independence, self-sufficiency and an opportunity for personal development in order that he may be unhampered in participating with his fellows in enjoying life and adding to knowledge.

Current Trends in Ophthalmology*

A. D. Ruedemann, M.D.

OUTLINES the progress made and the goal sought in caring for the eye problems of the school child, as well as the advances made in the technique of treatment of the most prevalent eye diseases, hereditary defects and eye injuries

PROBABLY all of you are aware that twenty years ago ophthalmologists established an unprejudiced board to qualify men to practice this specialty and the plan has now been adopted by practically all special branches of medicine. The value of this practical quizzing lies in the fact that it makes for better preparation; it brings out weaknesses in the preparation and, as a result, a better trained group of men are practicing ophthalmology. The value of this is readily seen since good preliminary training and good practice are synonyms in medicine. Good practice of ophthalmology is the best prevention for blindness there is. The earlier and the more accurate the diagnosis, the better the end result; all of us know that there is not a single eye disease that leaves the eye in as good condition as before the attack.

Ophthalmia Neonatorum

We no longer see so many cases of ophthalmia neonatorum but we still see them. This is one disease that may be controlled but it is not permanently eradicated. It must be watched constantly because the minute vigilance is relaxed, new cases appear. The treatment for ophthalmia is now much more satisfactory both in children and in adults. In the past ten years, the prognosis has changed from hopeless to good in adults. This has been brought

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about by more adequate treatment and the use of fever therapy, especially the heat cabinet. Gradually, this scourge to sight has been brought under control but the disease is still present and, even though treatment has improved, vigilance must be maintained because it is early diagnosis and early treatment that produce the best visual results.

Syphilis

Syphilis, the second great cause of blindness, is still with us. All of us are familiar with congenital interstitial keratitis but we do not realize the tremendous number of patients who are still afflicted with this and other forms of syphilis. There is no other disease which can manifest itself in so many forms and all of them bad. It makes little difference whether one loses eyesight by atrophy of the optic nerve or whether one goes mentally blind, it is still blindness. In spite of all the new methods of therapy and the new drugs which have been found useful, syphilis is still the great plague. No other disease requires the thoroughness of treatment, the skill in handling and the duration of time that this one does. Advancement has been made through the use of fever cabinet, foreign protein therapy and malarial treatment. Drug therapy is still the most commonly used and the most valuable, but in those cases in which eyesight is involved only a well-trained syphilologist and a careful oculist should treat the patient. Harm may be done by improper treatment and the therapy should not be directed so much toward a negative blood Wassermann reaction as toward a good functional result.

When we become familiar with syphilis in all its ramifications, its public cost and its tremendous burden to society, then, and only then, will this disease be better controlled, and this can be accomplished only by public health records of all cases and the use of those records. One hears more and more demand for this, and it must come if we are ever to lessen the number of congenital luetics and protect the mass of innocent people affected every year. It is perfectly stupid to go on year after year attempting to save lives and eyes when all our experience with infectious diseases teaches us that the best method of control is through a health bureau.

Tuberculosis

The third major eye infection is tuberculosis, which is difficult to diagnose and difficult to treat. It has a tendency to recur, is progressively destructive and produces considerable loss of vision. The most favorable form of treatment is complete bed rest during the active phase, high vitamin, high caloric diet and, later, some tuberculin vaccine. Like other forms of tuberculosis, the best treatment is rest, both local and physical. It is a common disease and has many forms of attack. The diagnosis is important, as removal of foci and fever therapy during an acute phase may stimulate the attack.

Hereditary Defects

Prevention is always cheaper and better than cure. Disease or physical defect has never improved the race; therefore, in those conditions where we can give advice for their prevention, we should do so. The transmission of known hereditary defects, of which we see our share, is fairly common. For this reason, people who have known transmittable defects should be controlled. There are now very good maternity centers and it might be advisable to instruct those in charge regarding ocular defects that are transmittable. The public's ever-increasing knowledge of heredity and education in the schools will naturally aid in this respect. Today, we still are in the dark ages as far as control is concerned, but we may advise the patient and hope that the advice will be followed.

Injuries

Last year there were 36,000 deaths and more than 300,000 injuries due to automobile accidents, and 20 per cent of the number injured suffered some visual defect. Most of the accidents are preventable, and where the law is strict in licensing and sentencing indifferent drivers, few accidents and few injuries occur. What is to be done for the ever-increasing mass of derelicts produced by trauma? These individuals are a tremendous economic burden—the majority cannot afford the initial cost of medical care to say nothing of maintenance later. There always will be accidents —and most of them are caused by carelessness, stupidity, and poor eyesight. The law that requires a railroad engineer to have a

definite standard of vision and to maintain it should be applied to automobile drivers. We of the medical profession should support measures to regulate driving and help protect the public from themselves.

Detached Retina

To return to ophthalmology, there has been, as you all probably know, a real advance in the treatment of separation of the retina (detached retina). The use of diathermy or cauterization of the choroid is successful in over 50 per cent of the cases if it is well done, and most of the cures are accomplished in the early cases. It is always good judgment to try to save an eye unless one knows that the fellow eye will never go bad. Surgery for the separation of the retina should be attempted and re-attempted; very few eyes are lost through surgery. The technique is constantly being improved and more patients are being operated upon, with the result that an increasing number of patients have their sight and more patients are willing to have something done for this previously hopeless eye condition.

Glaucoma and Cataract

As you know, the two great hazards to adult sight are glaucoma and cataract. Glaucoma is still the demon disease of ophthalmology. It may be painless and produce blindness by its insidiousness or it may, in one foul move, cause tremendous pain and blindness. Let us not forget that glaucoma is a disease not to be tampered with; the suspicious case must be thoroughly investigated and the facts presented to the patient. Glaucoma must be controlled by drops or by surgery if sight is to be retained and the patient must be under constant observation—his eyes are always on probation. Glaucoma is not a hopeless condition and most cases can be controlled and sufficient, efficient sight retained to carry the patient through life. New surgical procedures are constantly being brought forward—during the past year, Dr. Hans Barkan has developed a new surgical technique which will aid in the treatment of certain types of glaucoma. There may be an increase in the intra-ocular tension one day, or part of a day, and then it may be gone entirely for a day. Uncontrolled glaucoma means blindness, and procrasti-

nation is frequently the difference between economic vision and blindness.

When one talks of glaucoma, one has a natural tendency to think of cataracts. There are all kinds of lens changes and they may be due to many causes. It is safe to say that up to date the clearing of lens opacities is unsuccessful, but it has been shown that some of the opacities due to some systemic disease may be halted, with the preservation of sight. It is well to know that the fear of eye surgery is probably matched only by a patient's fear of brain surgery. Surgery should be performed only when it promises definite benefit to the patient and then it should be done when it will be of the most benefit.

Allergy and Deficiency Diseases

Allergy and deficiency diseases have recently been recognized as etiologic factors in ophthalmology. Allergic changes have long been recognized in other parts of the body but only recently have we come to realize that the eye, in as many ways, is also involved. Chronic, low-grade, recurring ulcers, chalazia, uveitis, and involvement of the discs are not uncommon. Acute flare-ups are numerous during the hayfever season and some patients have a peculiar individual sensitivity to chemicals, dust, etc. The important thing to remember is that these low-grade recurring ulcers and irritative processes in themselves may produce economic blindness and may so alter the condition of the eye that the way is paved for other conditions which will produce further loss of vision.

Of the drugs, the chief offender among women is face powder which contains orris root. Among men, the chief offender is either alcohol or tobacco, and it usually affects the individual who has a special sensitivity to the grain from which the alcohol is made and to the tobacco itself. In the treatment of eye lesions in patients suspected of having allergy, it is well to remember that the drugs used, including the cotton bandages and all detail substances, must be tested on the patient, and this is especially true with the drugs used in the treatment of chronic recurring ulcers. Several drugs are quite common irritants—they are atropine, butyn, dionin, and the mercury salves. When in doubt, a substitute drug should be found.

Strange as it sounds, dietary deficiency is common and this is

true because many people lack the knowledge to eat properly and others lack the funds. There are two main periods in life when humans may not have a properly balanced diet—up to six years, when they must depend on a mother's intelligence or lack of it to regulate their diet, and then later, after the active growing period. During the active growing period, children will, as a rule, eat everything and in this way get sufficient food to balance any type of diet. Following this, however, comes the age of discretion, of self-diagnosis and of diet. We now eat as we please and the things we think we know are good for us and, therefore, this is the second period of deficiency. There may be a deficiency of vitamin A, B, or any one or all of the others. We are now making more and more diagnoses of deficiency diseases and some of the eye conditions heretofore considered as idiopathic will fall in this group—rapid retinal fatigue, photophobia, and such known diseases as nyctalopia, and keratomalacia. Do not forget that the food we take in may be poisonous to us or that sufficient amounts of certain foods may not be taken in to supply the need of the individual for his or her job. We are testing out an apparatus, called the bio-photometer, which measures the light threshold and, as such, this also measures retinal fatigue and recovery, which is a function of the visual purple. This visual purple is derived from vitamin A. Mr. Frohring, of Cleveland, has developed this excellent apparatus and from our experience it apparently is a good clinical test for vitamin A deficiency. A point of interest is that a high percentage of patients with cataract are shown by this apparatus to have a definite vitamin A deficiency.

Eye Problems of the School Child

There are several new angles to the problems of the school child. First, it is becoming more and more evident that school children should be refracted and their ocular muscle balance tested before they enter school. This should be part of the preschool requirements and much time and worry could be saved for both the parents and teacher if youngsters were grouped according to their visual rating and this record followed in the instruction. The number of special study classes could be increased and intermediate groups could be arranged between those requiring sight-saving classes and

those with normal vision. To me, as well as to all of us in ophthalmology, this is one of the most important problems in our educational system. We realize that you cannot depend on the individual or his parent for good preventive measures but supervision must be directed in order to save waste of time in school. These visually handicapped youngsters must be protected against nervousness and unhappiness in school.

Definite progress is seen in the field of eye muscle training but there is still room for tremendous improvement, especially in the handling of the manifest squints and the prevention of blindness in the one eye that squints. Much could and should be said in regard to this group of patients. First, our method of handling them is inadequate—if paralysis of an arm or leg were to develop, immediately there would be a dozen institutions ready to receive the youngster. This is excellent, but a youngster with two functioning eyes is allowed to lose the use of one because we have not been able to evolve a system of hospitalization which provides for the continuance of education and treatment to prevent so-called amblyopia ex anopsia which is just another way of saying one is blind in one eye. Our failure is due to two main factors—first, lack of co-operation by the patient or his mother, either because of lack of time, funds, intelligence or just plain indifference; second, the lack of medical direction throughout the period necessary to secure good results. It is a complex problem but the end result, which is eyesight, is a most valuable one. Just now I have a man with a retinal detachment which is inoperable; the other eye is amblyopic and refuses to make any return to sight—he is unable to read, unable to carry on and now must be cared for.

Eye muscle surgery is an adjunct to the training of ocular muscles, but it is never the cure of amblyopia ex anopsia. It is rarely possible to eliminate training exercises and the type and time of surgery must be incorporated in the muscle training routine as the procedure necessary to carry the patient forward.

The handling of the youngster with a muscle problem requires serious consideration. More rigid and certainly more constant attention must be given to muscle training. Much can be accomplished, and we are all desirous of getting a good result, but good results require time, effort, apparatus, intelligence, and co-operation.

Half-way measures are worthless and present a further problem in that these patients, if not carried through to muscular stability, represent in later life the large number of the group of nervous, irritable people, high-strung people. The amblyopic patient is, as a rule, at least comfortable.

This is a particularly promising special field of endeavor for girls interested in eye work because there will be more and more need for girls who are capable of doing this type of muscle work. It requires patience of two kinds—first, with the child; and second, with the mother, who believes that muscle errors can be cured by snapping the fingers.

Two years ago, a program of education was started in Cleveland under the name of the Sight-Saving Plan. Lectures are given to all the Junior and Senior High School groups, the Parent Teacher Associations and any group that will listen. The lectures are presented either by a layman who gives medically supervised facts or by a medical eye man. These talks are well received and are beginning to show the value of the instruction. The youngsters are told of their responsibility to themselves in regard to their eyes and they accept this responsibility and I am sure will give more and better co-operation than ever before. It is a peculiar situation that, although the youngster of today has infinitely more knowledge than a decade ago, he is still shielded until he is through his college years. I believe we should first equip him mentally to think and then place the issue directly before him—it appears to be working in Cleveland.

Ophthalmology is a living, active branch of medicine. It moves forward slowly, carefully and with serious thought because, as you well know, eyes do not tolerate much experimenting. It is an association of the type of the National Society for Prevention of Blindness and the people connected with it that make progress. The needs of the patients, their vast number and the careful, constant check on disease are the factors necessary to stimulate investigation.

Preparing Student Nurses to Assume Responsibility for Eye Health*

Francia Baird Crocker, R.N.

AN outline of the basic principles of eye health which should be studied by the student nurse. It points out the need for variety of experience in hospital and clinic, and closer correlation between theory and care of the patient

THOUGH we see the curricula of schools of nursing becoming more social, all of us realize that present practices fall short of the objective: to understand the patient as an individual, his rôle in the treatment plan, what effect disease has upon his family and the community, and what can be done to prevent disease.

How various schools of nursing are attempting to meet the problem of preparing student nurses is of interest to us only as it applies to the field of eye health. Whenever conditions exist affecting large numbers of the population, a community problem is created and must be met. The hospital is an integral part of the community. Students of nursing are being prepared to participate directly or indirectly in health activities affecting individuals who make up the community. Are students of nursing being prepared in such a way that they are ready to assume their responsibility for eye health?

Groups Reached by the Nurse

The numerical extent of the problem of eye health can only be variously estimated. There are over 114,000 blind persons in the United States—almost equal to the population of Youngstown, Ohio. There are probably many more persons who have only

* Presented at the Annual Conference of the National Society for the Prevention of Blindness, Columbus, Ohio, December 4, 1936.

partial sight, it is safe to estimate, although no concerted attempt has been made to secure this information on any comprehensive scale. Statistics indicate some 300,000 eye accidents a year; over half of these are serious ones—several thousand result in the outright loss of an eye. In addition to these groups there are the potential blind and those persons who have some deviation from normal, making it necessary for them to secure treatment of one kind or another. Three clinics this past year cared for a total of more than 136,000 eye patients in New York City. Almost half the population of the United States, about 50,000,000, have some eye difficulty which makes it necessary for them to wear glasses.

What Problems of Eye Health Confront the Nurse

Preliminary to considering what student nurses should learn, we should consider their eye health program.

1. Is a careful examination of the eyes made not only upon the student's admission to schools of nursing but periodically throughout the years of attendance?
2. What preparation has been made for the student to use her eyes with comfort and efficiency in her own room, the library and the classroom?
3. Are glare, insufficient light—or exposed light sources within the field of vision—still tolerated during study periods?

The education of nurses has always emphasized the necessity of making the patient comfortable. There should be no crumbs from food left in the bed; mouth wash must be provided; the back rub is recognized as essential to prevent bed sores. But how many nurses allow patients to face the direct light all day long and, in addition, permit them to look at very glossy surfaces. Although for years the new school buildings have been constructed to eliminate glare and discomfort from cross lighting, even the newest hospitals are still being built so that there is scarcely a ward without cross lighting.

In preparing students of nursing to take their share in the responsibility for eye health, attention should be focused on the following: (1) content of formal instruction—lectures; (2) practical application of instruction—closer correlation between theory and the care of the patient; and (3) sufficient variety of experience

in the hospital and clinic for gaining an appreciation of the meaning of eye health, working always toward the goal of knowing the basic principles of eye health and of preventing eye difficulties.

Content of Formal Instruction

A brief review of the text books available in ophthalmic nursing shows the tendency to emphasize anatomy and physiology, and nursing techniques of various eye diseases. While the former is necessary information, the latter will naturally always vary with the personnel of the hospital, and must be changed to conform with the practices of the various ophthalmologists. Even in the teaching of anatomy and physiology of the eye it would seem advisable to make the subject more vital.

From the point of view of practical application, the following points are more fundamental than a knowledge of the five layers of the cornea:

1. Why it is dangerous for the nurse to remove foreign bodies from the cornea.
2. Which inflammatory conditions may lead to visual impairment.
3. How may treatments, such as irrigation of the eye, be administered so as to avoid injury to the cornea.
4. When is the cornea abnormal.

If it is impossible to extend the curricula in schools of nursing to include more than five or six lectures on eyes, then eye information should be available through other courses—not incidental to, but part of, the course.

Based on courses listed in the curriculum, the teaching of eye health could be included in the following subjects:

Subject	*Emphasis on Eye Health*
Personal Hygiene	Student's own eye health.
Dietetics	Relation of diet and eye health.
Nursing in General Medical Diseases	Relation of eye health and possibility of eye difficulties associated with general medical diseases.
Emergency Nursing and First Aid Psychology	Eye injuries and removal of foreign bodies.

Subject	*Emphasis on Eye Health*
Occupational Therapy and Recreation	Emotional factors in working with eye patients.
Modern Social Movements	Organization of international, national, state, and local agencies to prevent blindness and promote eye health.
The Case Study	Discussion of glaucoma case stressing the following: (1) social significance of treatment; (2) understanding patient's responses; (3) knowing community resources for assisting patient; (4) understanding cost of illness; and (5) preventing blindness from glaucoma.

Closer Correlation Between Theory and Care of Patient

In order to bring about a closer correlation between theory and care of the patient, students of nursing must be taught individualized care of the patient in terms of health as well as disease. They must also be taught to appreciate the social significance of illness to the family and to the community; how to assist the patient in making mental and physical adjustments and planning for recreational or vocational guidance.

In one hospital having a large ward for eye patients it is considered a special privilege among the graduate nurses to be asked to work in the eye service. The supervisor is fully aware of the emotional factors involved in caring for eye patients. Some attempt is made to meet the need for recreational and vocational guidance for persons in the hospital but no effort is made to extend this service beyond the hospital.

The Seeing Eye is giving a most interesting service to blind persons. The newly blind person, instead of going to his home upon discharge from the hospital, goes to Morristown, New Jersey, for a course of training with one of the guide dogs of the Seeing Eye. When he completes this training he then goes home independent of sighted friends or relatives. This is putting into practice the theory of teaching the patient to care for himself after he leaves the hospital. Just such a carry-over of treatment should be possible, and is of great importance, in cases of serious and prolonged eye difficulties.

Varying the Student's Experiences

Often the experiences of students of nursing with eye patients are confined to a small number of patients admitted to the hospital. Unless the student's clinic service is rotated, many nurses never have the opportunity of spending any time in the eye clinic; yet many of the serious eye difficulties are treated almost entirely in the clinic. When the student does spend time in the eye clinic she is likely to be assigned the duty of keeping the trial lens case clean, keeping the instruments shiny, and assisting with an occasional minor operation performed in the clinic. The interpretation of the eye difficulty to the patient, teaching the patient to follow out the ophthalmologist's instructions, removing obstacles in the carrying out of treatment, are overlooked or turned over to the social worker, if there is one in the eye clinic. Even the patient who is eager to co-operate in the treatment plan needs help in understanding what he is supposed to do and how he is to carry out treatment at home.

Complete clinic service will be realized when each patient is taught the reasons for certain procedures in order to gain his co-operation, and when he is taught in such a way that treatment and preventive measures will be carried out regardless of his economic situation or social background.

In spite of the great numbers of people in need of eye care and knowledge regarding the prevention of eye difficulties, many students of nursing complete their course with no appreciation of eye health. If, as graduated nurses, they wish to pursue the subject further, there are, according to the report compiled by the National League of Nursing Education, only four hospitals giving courses to graduate nurses in eye, ear, nose and throat nursing.

Summary

In closing it may be well to reiterate that in preparing students of nursing to meet their responsibility for eye health we must focus attention on the following factors:

1. Content of formal instruction.
2. Closer correlation between theory and the care of the patient.
3. Sufficient variety of experience in hospital and clinic, working always to include the basic principles of eye health.

Editorials

May First—Child Health Day

ON May first, throughout the United States, parents and teachers will be celebrating May Day with the children of the nation—dedicating the day to the subject of child health. Every park will be turned over to children—for athletic contests and programs celebrating the child's growth, vigor, and safety from hazards. The radio and newspapers will observe the occasion with special features and programs.

In considering the joyousness of the occasion, may it not be well to ponder on how much the health of the eyes contributes to the general wellbeing of the child, and how many advances have been made in preventing eye tragedies to children? The color of the Maypole streamers, the rhythm of mass gymnastics, the merry faces—all are tributes to the human being's ability to see. Society is fast acknowledging that a sightless child cannot be considered an entirely healthy child. Until needless blindness is wiped out, the National Society for the Prevention of Blindness will feel it is making an important contribution toward the glorious celebration of May Day.

But it must not be forgotten that the gaiety of May Day is made possible and real only by the observation of the principles of health every day of the year. Good health can be celebrated only when all its aspects, including sight, are cared for constantly.

Elihu Root, 1845–1937

THE National Society for the Prevention of Blindness has lost its distinguished honorary president, Elihu Root. The whole prevention of blindness movement is united in the sad loss of this friend and will agree with the sentiments expressed in the following resolution passed by the executive committee of the Society:

> The death of the Honorable Elihu Root marked the passing of one of the distinguished citizens of the world. Jurist, states-

man, arbitrator, his name was brilliantly associated with movements for justice, peace, understanding. Indicative of numerous services in behalf of universal fraternity which claimed his devotion was his presidency of the Carnegie Endowment for International Peace from 1910 to 1925, and among the tributes signalizing public recognition of his activities may be cited the Nobel Peace Prize conferred upon him in 1912. Leadership in the field of jurisprudence and responsibilities in the affairs of state did not preclude an interest in organizations concerned with the health and welfare of the community, and it was a source of deep gratification to the National Society for the Prevention of Blindness when in 1930 he gallantly responded to the call to become its honorary president. His loss is recorded with great sorrow.

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request

What Public Health Nurses Should Know About Hygiene of the Eyes*

The eye is a marvelously delicate and most complex organ, able to take twelve to fourteen perfect pictures every second and to send on the complete pictures for the brain to interpret. This requires precision and a perfectly working organism. It has been said that 90 per cent of our knowledge of the outside world comes to us through our eyes.

Health is that state in which all the natural functions are performed freely without pain or disease. Eye health must then mean these functions performed naturally without pain or disease.

This paper does not deal with vision, or the prevention of poor vision, alone, but with all the conditions of eyes which lessen the acceptability of a particular person to society.

Prenatal and Congenital Infections Causing Blindness

The range of interest in eyes of the public health nurse begins with the care of the child before it is born. The condition of the mother's health from every angle is her concern. She must know how to get the expectant mother to a reliable physician for a complete physical examination and how to secure treatment or correction of defects when found. Prenatal and congenital infections in relation to blindness and impaired vision, such as infections from gonorrhea and syphilis, should be first-hand knowledge of the public health nurse, and, in co-operation with the attending physician, this knowledge should be imparted to the expectant

* Presented at the Annual Conference of the National Society for the Prevention of Blindness, Columbus, Ohio, December 4, 1936.

mother. If an infection exists, how to secure treatment and how to secure the co-operation of the parents of the expected child are no small functions of her duty. The reason why many infected patients are not treated is not only a question of economics but often of ignorance of the great harm that may be done to the newborn child.

Ophthalmia neonatorum, of which 75 per cent is due to gonorrhea—the cause of much visual deterioration from corneal scarring in children not blinded—and interstitial keratitis—the most evident of the congenital or prenatal infections due to syphilis—are the two diseases for which immediate treatment is necessary.

The nutrition of the mother is important. Certain forms of keratitis in early childhood may be due to the poor general health of the child. The health of the eyes is dependent in a large measure upon the health of the body. Nervous disorders, focal infections, tuberculosis, acute infectious diseases, disorders of metabolism, may be the causes of eye difficulties.

Focal Infections and Deficiency Diseases

Focal infections are a prolific cause of eye disease. In such cases a localized area of disease, occurring in remote parts of the body, gives rise to certain eye conditions which may terminate in blindness. The most frequent sites for these focal infections are the teeth, tonsils, nasal sinuses, intestinal tract, and the genito-urinary organs.

Certain eye defects may accompany deficiency diseases. We know that a deficiency of vitamin A causes night blindness, and there is a theory that cataract formation is related to a lack of vitamin G. This has been proved by experimentation with animals.

There also is a theory that shyness in children is often due to impaired vision. We know of a child who stuttered at the age of 22 months and was very shy. At the age of four years she had a complete eye examination and was found to have very poor vision. After being properly fitted with glasses, the stuttering disappeared. She was less shy and her behavior was improved. Later she broke her glasses and was without them for about four days. The stuttering reappeared, but after she was again fitted with her glasses, it disappeared.

Importance of Eye Care in Early Childhood

Early childhood is the time to detect and correct visual disabilities. At work or play an intelligent parent or a teacher can detect impaired vision in a child. Farsightedness is a normal phase of the early growth and development of the eye. Unless there are signs of strain or an evidence of cross-eyes in children of nursery school age, farsightedness is to be looked upon not as a defect but as a normal characteristic

to be taken into consideration in planning the children's work or play activities.

We must remember that the eyes of the young child, like the rest of the body, are in a stage of growth. Too close work should not be required of him.

The eyes of young children are much more susceptible to infection than are the eyes of older children or adults. Cleanliness and proper facilities for the washing of the face and hands are public health measures used in prevention of infections. It is not enough to teach the parents and the child the importance of cleanliness only, but it is necessary to teach the proper facilities used in performing these functions. Schoolroom equipment for cleanliness is as necessary as home equipment. It is often the duty of the nurse and teacher to interest the school authorities in providing this equipment.

Correct Lighting and Equipment at School and at Home

Proper lighting of homes and schoolrooms is very important in eye health. Illumination should not be judged by the brightness of the lamps, but by the amount of light at the place where it is needed. The trial and error method of lighting classrooms in schools should no longer be tolerated. Not only recognition, or discovery and correction of visual defects among children, but also the prevention of visual defects, should interest the public health nurse. She, therefore, must be informed about the lighting of rooms, the sun or lamp glare, the position of students at their desks, etc.

Two buff-colored window shades of durable, woven, translucent material, on rollers fastened at the middle of the window, furnish a satisfactory means for the control of the light. One may use a buff curtain of translucent material if shades cannot be purchased; even brown wrapping paper could be used in emergencies.

Tables and chairs should be adjusted to lights, and children should be free to move their desks about so that they may avoid facing a bright light.

Not only is the light as it falls on the book important, but the right kind of printing is needed. Publishers should print books so that the print is clear and easily read, for children use their eyes on books or blackboards constantly for a great number of years.

The guiding of parents in an understanding of the eye health needs of children is an important function of the teacher and the school nurse.

The intelligent choice of toys is essential if accidents are to be prevented in childhood. Toy guns, firecrackers, sharp-cornered blocks or sharp-pointed objects, such as knives, scissors, hooks and sticks, have no place in the play equipment of young children.

Protecting the Eye in Industry

In industry, we have a similar picture to that of the home and classroom. Correct lighting is exceedingly important for the protection of workers when the eyes are used for close work or where attention is given to one object for any length of time. Eye fatigue may be due to insufficient light, too much light or glare, flickering light, or too long-neglected eye conditions requiring refractive or other corrective measures.

Short periods of rest should interrupt all kinds of close work, during which time the eyes should be directed on distant objects.

Accident hazards are, of course, the most serious of all industrial hazards. A great many mandatory rules for the protection of workers have been made in industries. The rules are useless unless they can be enforced or there is all-year-round educational activity.

It appears from statistics that the actual cost of eye injuries in industry is in the neighborhood of $50,000,000 a year. The employers, employees and the community are interested, even if from entirely different points of view. The community becomes interested when the employee becomes a ward of society, as often happens. Rehabilitation of those with visual handicaps is the most difficult. An arm or a leg, if lost, may be replaced by an artificial limb, but the sight of an eye, if destroyed, is irreplaceable. You cannot see through an artificial eye. Hygienic conditions are as necessary here as in the schoolroom or home. Restrooms, lockers, baths and toilets, as well as places for the storage of food and clothes away from fumes and smoke, and proper washing facilities, are needed.

The common house fly is a source of infection and has been known to cause epidemics of eye trouble.

A complete examination of the eyes may easily be the most important part of a physical examination. It not only demonstrates the individual's ability to see but may reveal conditions of the general health which are overlooked in an ordinary physical examination. For instance, unsuspected kidney disease, diabetes, brain tumor, syphilis and tuberculosis are often detected by the ophthalmologist without the aid of a general physical examination.

Rôle of the Public Health Nurse in Care of the Eye

Public health nurses, visiting as they do from several hundred to several thousand homes every day, are invited into those homes very often because there is some actual personal service to give. They have an exceptional opportunity to interpret eye health in an easy, natural way to the mothers in the homes, to the fathers and to the growing children.

All public health nurses have general information. Some of it is

specific, much of it is oftentimes vague. A nurse cannot teach that of which she is not thoroughly aware. Since the public health nurse sees the family as a whole, which means the environment and all that pertains to the living of the family, she must be familiar with everything that affects the health of the human being.

The health worker of today is fortunate in that she can secure reliable information from books and pamphlets, from national, federal and state agencies, that will guide her in the giving of advice to parents and teachers regarding health and the prevention of blindness.

S. GERTRUDE BUSH, R.N.
Columbus, Ohio

What Is Wrong With Our Fifty Foot-Candle Installations?*

There has been much discussion during the past two or three years about higher levels of illumination —20, 50, and 100 foot-candles for stores, offices, and schoolrooms. Many of you feel your major difficulty lies in your ability to sell such installations. My own belief is that the major task is to know how to supply comfortable lighting at these levels after you have convinced the customer of its desirability. All of you have made installations of general lighting at these high levels; probably in most instances you have been able to persuade yourself that they are tolerable. In the case of an office, for example, you use the well-worn argument that a person's gaze should be directed down toward his work rather than up toward the ceiling. However, the fact that you have had to persuade yourself and your client that the results are all right is in itself an indictment of the lighting system. The right kind of an installation would not have suggested the possibility of discomfort.

Visibility and comfort are two separate factors which do not always overlap completely. One cannot conceive of high comfort where the visibility is low for the task at hand; however, the converse is not necessarily true. There may be a definite lack of comfort in installations where the visibility itself is high, and this lack is usually obvious, whereas the lack of comfort resulting from insufficient foot-candles and consequent low visibility may be more subtle. The paper by Luckiesh and Moss, entitled "Quality of Lighting," in the 1935 Illuminating Engineering Society *Transactions*, dealt largely with the visibility aspect, although somewhat with comfort. This paper is limited to a consideration of a type of discomfort which is noticeable almost immediately.

* A paper presented at the 30th Annual Convention of the Illuminating Engineering Society, Buffalo, N. Y., August 31 to September 3, 1936, and reprinted, with permission, from *The Magazine of Light*, October, 1936.

Please note also that I refer to results secured from strictly general lighting systems. Both general lighting and general lighting plus supplementary lighting have advantages and disadvantages peculiar to themselves. The difficulty from the standpoint of comfort of which I speak now is one peculiar to general lighting systems.

What, then, is the difficulty with these 50 foot-candle general lighting installations? It is usually a question of brightness, and unquestionably something is usually too bright—perhaps the luminaires, perhaps the ceiling and walls of the room, or perhaps some reflection from the principal surfaces illuminated. The chief trouble is that the methods and luminaires that we have employed with entire satisfaction for 5 and 10 foot-candle installations somehow become very cantankerous when we build the level up to 20 or 50 foot-candles. Perhaps something is lacking in our knowledge of the fundamentals of the science with which we have to deal.

The truth is that few of us have given real hard, serious thought to the subject of brightness. Let me illustrate by means of a question that I have been asked frequently: "Why isn't it all right to put a 200-watt lamp in an enclosing globe designed for 100 watts? The brightness goes up two to one, but so does the illumination, and everything should be satisfactory." But should it? On our way to answer that question let us first briefly compare moonlight and sunlight. The moon is 2159 miles in diameter and 238,000 miles away. The sun is 853,000 miles in diameter and about 92,000,000 miles away. In other words, the sun is almost exactly 400 times as large as the moon and almost exactly 400 times as far away. The two bodies look to be of the same size as we view them in the sky. The only difference is that the sun is brighter and the illumination it produces is higher in the same proportion.* Shouldn't the sun be just as easy to look at as the moon? Perhaps it would be if our eyes were just camera eyes instead of human eyes, but they are not, and while it is comfortable, even intriguing, to look at the moon, only an eagle is reputed to gaze upon the sun. Don't be misled into regarding the moon as a weak light source. It isn't. It gives something like 35,000,000,000,000,000 candlepower. Furthermore, its brightness is about 1500 foot-lamberts, whereas that of the earth as illuminated by it is not more than 0.01 foot-lambert, a ratio of 150,000:1. Still the results are not at all uncomfortable.

Suppose we were to try to bring moonlight into an office. We would have a light source of 1500 foot-lamberts brightness (about three candlepower per square inch) and

* In the ratio of about 400,000:1.

two-thirds of an inch in diameter. A source just about the size of a candle flame and of its brightness would fairly well represent the moon if hung seven or eight feet above the desk tops in an office. A candle flame is not glaring under such circumstances, and measurements will show that brightness contrasts are of the order of 150,000:1 (the same ratio as in actual moonlight). What, then, is all this we hear about holding contrasts down to 10:1 to insure comfort? That is where the eye is entirely different from a camera; it becomes infinitely more particular about brightnesses and contrast as illumination goes up, and exceedingly so at sunlight levels.

You have noticed that I am using a conversational style in approaching this subject of brightness; it is by intent, and I desire to continue in this vein because the figures I will use and the ratios I will cite are, for the most part, far from mathematically precise. I do not want you to draw too fine-spun deductions from them. In fact, one of the reasons for writing this paper is to encourage others to conduct more thoroughgoing investigations yielding more exact quantitative results in this field.

You will note, also, that in all cases I have expressed brightness in terms of "foot-lamberts"—the brightness of a diffuse surface reflecting or emitting one lumen per square foot. It is very desirable to get used to thinking in the same terms when we deal with the brightness of light sources and the brightness of the surfaces which they illuminate. In the past we have used candlepower per square inch frequently when dealing with light sources, but this kind of term becomes cumbersome when applied to the brightness of illuminated surfaces. Foot-lamberts, or millilamberts, cover both very acceptably. As long as we use the term foot-candle rather than lux in this country, we should also use foot-lambert rather than milli-lambert, although the two units are within 8 per cent of being the same quantitatively.

I now wish to make two very simple visual demonstrations which will illustrate the two main points of this paper:

1. The first shows that a 1500-lumen (100-watt) lamp in a six-inch globe (28 square inches projected or apparent area) is distinctly more comfortable to look at than a 6000-lumen lamp in a twelve-inch globe (112 square inches projected area), although the intrinsic brightness of the two is the same. If we try a 4000-lumen lamp, you will probably agree that it is just about as hard to look at in the twelve-inch globe as the 1500-lumen lamp is in the six-inch globe. It is not sufficient to increase the area of a globe directly with the lamp lumens, but for equal comfort the diameter of the globe must be increased almost as fast as the light output of the source. Consequently the globe area will in-

crease nearly with the square of the lamp lumens.* How different this rule is from our ordinary commercial practice where for a 5500-lumen (300-watt) lamp we recommend a globe only 60 per cent larger in diameter than for a 1500-lumen (100-watt) lamp. Actually, it should be three or four times as large.

2. The second demonstration is to a certain extent tied in with the first. It shows that if you have two backgrounds, one illuminated to one foot-lambert and the other to ten foot-lamberts, and two light sources are placed in front of these backgrounds, it is not satisfactory to have one of these light sources ten times as bright as the other; in fact, the source in front of the ten foot-lambert background must not be much more than twice as bright as the other.†

These facts are not new. Twenty years ago Dr. P. G. Nutting presented a paper before this Society in which he showed that if a source of 1700 foot-lamberts brightness was comfortable in surroundings of one foot-lambert brightness, then when the brightness of the surroundings was increased from one foot-lambert to ten, the permissible brightness of the light source could not be increased from 1700 to 17,000 foot-lamberts, but only from 1700 to 3400 foot-lamberts, assuming that the source was to remain correspondingly comfortable in those surroundings. This indicates that we can tolerate a contrast of 1700:1 when the brightness of the surroundings is one foot-lambert, and a contrast of only 340:1 when the base is only ten foot-lamberts brightness.

He found further that a contrast of about 45:1 is the limit for comfort where the surroundings have a brightness of 200 foot-lamberts. If the curve were extrapolated a little further, you would soon come to a point where a contrast of not more than 1:1 was indicated (Fig. 1). This indicates a condition where the eye simply cannot tolerate any increase in brightness under any circumstances, regardless of the surroundings. This would correspond to a brightness of about 50,000 foot-lamberts; that is, about five times the brightness of sunshine on a white surface.

Let us try to apply the conclusions gathered from these two demonstrations to a practical problem. Suppose we have a schoolroom illuminated to two foot-

* A preliminary investigation in 1919 by Ward Harrison and E. W. Commery and several observers indicated that the diameter of a source should increase at least as fast as the light output. *Transactions*, Illuminating Engineering Society, Vol. XV, Feb., 1920, page 34.

Data by L. L. Holladay, *Journal of the Optical Society of America*, April, 1926, page 306, indicated that the necessary increase in size of source is a geometric mean between increasing its diameter in proportion to the light output and increasing its area in that proportion. In other words, his data show that the diameter need not increase as fast as the light output, but that the area must increase faster.

† *Transactions*, Illuminating Engineering Society, Vol. XI, Dec., 1916, page 943. Dr. Nutting's results were checked by Mr. Holladay's data, *Journal of the Optical Society of America*, April, 1926.

candles (average in service) obtained from four 1500-lumen (100-watt) lamps in ten-inch enclosing globes nine feet above the floor—not a particularly desirable way to illuminate a schoolroom, but let us assume that the luminaires are just inside the limit of what is comfortable, but nevertheless definitely within that limit. If we want to increase the illumination to twenty

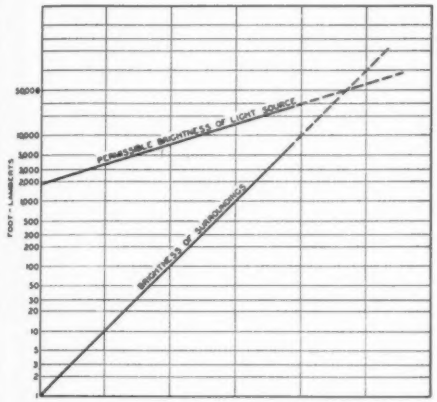

Figure 1.—The relation between permissible brightness of light source and brightness of surroundings.

foot-candles, we have to use 15,000-lumen (750-watt) lamps in each outlet and, according to demonstration 1, our globe diameter should increase between five and ten times; that is, to somewhere between 50 and 100 inches, to be as comfortable as the 1500-lumen lamps in ten-inch globes. It is true that this diameter might be shaved down somewhat due to the higher brightness level of the twenty foot-candle room,* but this is of academic interest only, since we have neither one hundred-inch globes nor forty-inch globes. Our figures indicate that we cannot use direct lighting from ordinary enclosing globes in this schoolroom if we wish conditions to be comfortable. The only way to obtain such diameters of light source is to utilize the ceiling above each unit; in other words, to install some form

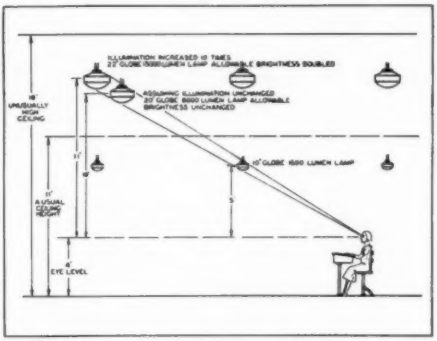

Figure 2.—The relation between mounting height and permissible brightness of light source.

of indirect lighting. My general observation has been that indirect lighting furnishes a very satisfactory means of solving the problems requiring twenty foot-candles of general illumination.

* Demonstration 2 shows that this increase in the brightness of surroundings of 10:1 permits of doubling the light source brightness; hence the globe area may be reduced by one-half, which means that the diameter is reduced 30 per cent.

But suppose we want 200 foot-candles. Under these circumstances our diameter of light source would have to be from five to ten times that which is required for twenty foot-candles. This would require a ceiling area twenty feet, or possibly forty feet, in diameter, evenly illuminated above each of the lamps in the room. There is no such area available on the ceiling and the conclusion which must be drawn is that 200 foot-candles is beyond the limit of comfort for indirect lighting, for the ceiling, if within the field of view, will become offensively bright. As a practical matter, we seem to be at about the limit for indirect lighting at forty or possibly fifty foot-candles in a room of usual dimensions.

Where the ceilings are unusually high, our problem is very much simpler. If the height of the luminaires above the eye level can be doubled, they will appear to be only half the diameter. With a fixed level of illumination it is permissible under these circumstances for a twenty-inch globe to have just as great a brightness as a ten-inch globe at half the height (Fig. 2). This means that in the schoolroom considered it would be possible to put 6000 lumens in a twenty-inch globe if the units were hung ten feet above the eye level (fourteen feet above the floor) instead of five feet above the eye level (nine feet above the floor). And taking into account the increased level of illumination, the 6000-lumen lamps could just about be used in sixteen-inch globes mounted twelve feet above the floor. In twenty-two-inch globes, the 15,000-lumen (750-watt) lamps required to produce twenty foot-candles would give a comparably comfortable result if suspended at a height of fifteen feet above the floor (eleven feet above the eye level); in other words, in a room with a ceiling height of about eighteen feet. It may also be deduced that in this eighteen-foot room at least 100 foot-candles could be obtained without undue brightness if indirect lighting were used.

Many of you have observed installations in high-ceilinged rooms where the luminaires were not in themselves of a particularly high degree of excellence, and yet where the illumination effect seemed very soft and satisfactory. The pleasing result was probably due, more than anything else, to the high mounting of the light sources. Even bare frosted lamps may be acceptable under such circumstances, as in the case of the auditorium of the Port of New York Authority Building.

Our main problem, however, is with offices, schoolrooms, and stores having ceiling heights seldom above twelve feet, and often less. It appears that it is not possible to produce fifty foot-candles and upwards in such interiors unless the principal light source, whether it be an enclosing globe or an area of ceiling, is shielded from the ordinary field of view. It is not hard

to do this in the case of an area like a show-window or a theatre where everyone views the display from one direction. The same result can in a measure be accomplished in an office or a schoolroom by placing shades or shields around the luminaires. Under these circumstances, however, if the globe brightnesses are high, both shadows and reflected glare may prove annoying, particularly in an office. In some instances a somewhat similar principle, open to the same objections, has been followed by recessing the light sources in the ceiling and louvering them. Another method is to design the room with deep beams across the ceiling and have indirect lighting units so placed that their light is concentrated on the ceiling between the beams rather than on the beams themselves. A coffered ceiling with units of reasonable brightness—for instance, artificial skylights three feet square in the top of each coffer—is a very good equivalent of the ceiling beam idea. Another possible solution of this problem is one we have been experimenting with in my own office, where the areas of ceiling which receive light from the indirect units have the cross-section of a parabola. Under these circumstances the principal light directed toward the working surfaces comes from directly above, and distant portions of the ceiling appear to have a very low brightness entirely tolerable to the eye.

In conclusion, I would like to leave with you the following rather general statements of three fundamentals of illumination design that affect the comfort of a general lighting system. As I have said before, the figures used are not precise, but I think they represent about the right order of magnitude:

1. When the light output of a visible source is increased ten times, its brightness should be decreased to not more than one-half, or perhaps even to one-fifth, of its former value; in other words, the light output of a source cannot be increased as fast as its area, but it is safe to increase the output as fast as the diameter.

2. Increasing the general level of lighting in a room ten times permits only of doubling the brightness of the light source.

3. Doubling the mounting height of a unit permits of increasing approximately three times the lumen output of the lamp which may be used in that unit.

These three conclusions taken together may make it clearer as to why we can look comfortably at the moon by night, but not at the sun by day; why a room is sometimes rendered more comfortable with half of the window area covered by drawing the shades; and finally, why we cannot handle 50–100 foot-candle installations by our five- and ten-foot-candle methods and reasonably expect to achieve success.

WARD HARRISON
Cleveland, Ohio

Note and Comment

Announcement of Summer Courses for Training Sight-Saving Class Teachers.—Four colleges and universities are offering summer courses for the training of teachers and supervisors, as well as for all teachers interested in conserving the sight of their students.

The elementary course to be given at Western Reserve University, Cleveland, Ohio, begins June 21 and extends through July 30, 1937; registration, June 21. At Wayne University, Detroit, Mich., it will be given from June 28 through August 6; registration, the week prior to June 28. The course at Teachers College, Columbia University, New York, N. Y., extends from July 12 through August 20, with registration July 8, 9 or 10.

The advanced course at Western Reserve University begins June 28 and extends through the month of July; reservations may be made by mail and must be in the hands of the registrar before June 5. At Teachers College, the advanced course occurs simultaneously with the elementary course, July 12 through August 20, with registration July 8, 9 or 10.

Further information regarding the courses, including details of housing and tuition, may be obtained from the universities or colleges.

General Institute on Eye Hygiene, May 3–28.—The National Society for the Prevention of Blindness is holding an Institute in its offices at 50 West 50th Street, New York City, for public health workers and social workers. The committee on arrangements consists of Conrad Berens, M.D., Miss Jeanne Wertheimer and Mrs. Francia Baird Crocker, R.N. Willis Knighton, M.D., will be the ophthalmologist in charge of the lecture course. Lectures, discussions and demonstrations will be given by ophthalmologists, public health officers, social workers and staff members of the Society. Complete programs are available upon request.

There is no tuition fee. Applications may be made to the Society. Persons who are unable to attend all the lectures but who wish to take advantage of special ones should indicate the

date and lecture in making inquiry. A list of inexpensive places to live will be sent upon request.

Annual Report of the Illinois Society for Prevention of Blindness.—No one reading the annual report of the executive secretary of the Illinois Society for Prevention of Blindness could fail to grasp the energetic and stimulating drive of that organization in stamping out blindness and saving sight in its state. On a limited budget, the Illinois Society seems to have covered a tremendous volume of service, from reduction of ophthalmia neonatorum to stamping out trachoma. In the past year, 7 new sight-saving classes were opened in the state of Illinois—a tribute to the untiring efforts of this Society. Its program is an excellent example of what can be done in combining case work with public education in a local program of sight conservation.

Safe Drivers.—The value of testing the individual motorist is brought out in a recent article by Dr. Harry De Silva of the Harvard University Bureau for Street Traffic Research, in which he describes the testing apparatus used at this year's automobile show. The importance of good eyesight is shown in the inclusion of tests for vision for night driving, ability to recognize traffic lights, color blindness, tunnel vision and eye-hand co-ordination necessary to steer a car over a shifting road for a period of one minute. Since the rapid increase of night accidents over day accidents has been thought to be most commonly due to the menace of glaring headlights, a test was also given to measure sensitivity of the individual to glare and its effect on driving.

California is now using the instruments which Dr. De Silva has developed and which test sensory and muscular reaction time, eye keenness, judgment of depth, width of vision, muscular imbalance and astigmatism of eyes, judgment of speed and co-ordination of hand and eye. Persons tested are those who have had fatal accidents, multiple nonfatal collisions, habitual violators of traffic laws, and good drivers, who, because of their fine records over a great number of years, have been invited to come in and be tested in order that their tests may be compared with those of drivers whose records are bad. The chief of the division of drivers' licenses of

California says: "Quite frankly, we are experimenting, but from these machines we expect to develop examinations and information that will enable the division of drivers' licenses to play a prominent part in the work of reducing traffic accidents and fatalities."

Many dangers have been discussed and demonstrated recently in connection with safe driving, and there are undoubtedly many factors which contribute to the unnecessarily heavy toll of death or injury because of accidents. No one—after a little serious consideration of the results of poor eyesight on the road—can deny that eye examinations should be a vital part of the driver's test in every state in the Union. Even though a person's eyes are normal when he is tested for a license, he may later develop a serious eye disease, lose an eye or have good sight but a minor defect, such as a restricted field of vision, which makes it impossible for him to see anything approaching from the sides or from hills; and yet the driver's license, once issued, is automatically renewed each year without any further attention being paid to his health, and particularly to his eyes.

New Magazine.—One of the initial activities of the recently established Office of Public Health Education by the United States Public Health Service has been the publication of a bulletin of current health information entitled *The Health Officer*. This monthly digest for officers of the service, health officials throughout the country, and those of the laity who are interested, reports current happenings in all branches of community health and of science concerned with public welfare. Abstracts from current literature and reviews of significant books are presented. The magazine, although mimeographed, is attractively bound and, judged by the first few issues, promises to be a helpful addition to the literature in the public health field.

A School Program for Saving Sight.—In York, Pennsylvania, the public schools provided facilities for having the children's eyes tested and the amount of light under which they work measured as a part of a sight conservation program. In addition, sight-saving equipment has been installed in 62 classrooms. The results of the tests made, as well as excerpts from current literature on

sight saving, are published in "A Local Study Bulletin or Reference Manual," which has been placed on permanent file for the teachers' reference. Enclosed in the report are sample copies of the mimeographed letter to each teacher and the forms on which she was requested to report her sight-meter tests.

Prevention of Blindness in Hawaii.—The program of conserving sight in Hawaii during the past year included preschool and public school vision testing, and the establishment of sight-saving classes. It was carried out by the director of conservation of sight and work for the blind in Hawaii, in co-operation with the Territorial Medical Association, the Board of Health, Department of Education and various private and service organizations, such as the American Red Cross and the Adult Blind Association. A comprehensive report for the year ending June 30, 1936, describes the work in full.

Massachusetts Protects Eyes.—The number of industrial eye injuries in Massachusetts was more than cut in half between 1919 and 1935. How this excellent record has been accomplished is contained in the following extracts from the report of the division of industrial safety for the year ending November 30, 1935:

"The provisions of law to protect the eyesight of employees occupied a prominent place in the work accomplished through inspection of industrial establishments. When the nature of the work or the machinery used suggested danger of injury to the eyes of employees, mechanical devices were required for their protection. Suitable goggles and transparent shields were among the means required for this purpose.

"The industrial bulletin issued by the department and containing suggestions to employers and employees for the prevention of eye accidents was circulated among employees working in trades where eye injuries were numerous. The importance of taking care of the eyes was stressed in this publication.

"During the year 242 orders were issued requiring compliance with the provisions of the lighting code and these have been complied with. The inspection work required in this connection protected employees from glare and provided better distribution of light. Improvements were made in the proper shading of lamps which increased the intensity of illumination in the work place and made lighting adequate at the entrance to and exit from the

establishment. The accumulation of dust and dirt on lamps in some cases was found to impair the efficiency of the lighting system and regular cleaning of the equipment was urged. In many cases it was necessary to change the locality of the lighting source, especially where polished surfaces caused eye fatigue and interference with vision. To maintain adequate light in the workroom, tests were made of the lighting volume and advice given with regard to the height and location of lamps and the use of shades for reflectors. In the basements of mercantile establishments which are used largely for storage purposes, sufficient lighting facilities are necessary to prevent injuries to employees by stumbling over obstructions in passageways. These places were inspected with other parts of the establishment and careful attention given to the distribution of sufficient light in these work places."

Eye Health to Receive Special Study.—"Public Health Nursing in Expanding Statewide Health Programs" is the theme of the continuation study program offered this year by the New York State Department of Health to public health nurses throughout the state. About 1,600 nurses enroll annually in this staff education project. The health programs that are to receive special study this year are maternal and child health, orthopedics, syphilis control, eye health, and cancer control. At a series of one-day institutes, to be held in 15 convenient centers in the State, the director of each of these programs, with a staff of assistants, will outline existing needs, plans for increased effort, and the newest aid and information for participating in the respective activities.

New Eye Service in England.—A national campaign to educate the British public in the care of the eyes has been undertaken by the National Ophthalmic Treatment Board in conjunction with the British Medical Association, which will be carried out by means of booklets, lectures, and motion pictures. Particular attention will be paid to children and, where possible, further national eye service centers will be opened to provide treatment, at a nominal cost, by qualified eye doctors.

Saving Sight in India.—Sixteen lectures on the prevention of blindness were delivered in Bombay under Junior Red Cross auspices in all the main cities of the Presidency. These lectures were

given by various doctors to municipal school teachers, scoutmasters, in Social Service League training centers and in schools. In the report on the course it is stated that the lectures have been more than worth the money and effort expended on them, and that similar projects will be of great educational value, the results of this type of propaganda being more far reaching than any other kind. The lectures were attended by over 2,000 persons, many groups asking for further lectures and expressing willingness to pay for them. It is hoped that other branches will also undertake this method of fighting blindness among people, many of whom suffer equally from ignorance of the proper methods of overcoming eye diseases, from carelessness, and from lack of eye hygiene.

National Society Notes.—In connection with sight-saving classes, as well as with other aspects of the Society's co-operative program for conservation of vision, Mrs. Winifred Hathaway, associate director, has conferred with key people of the National Education Association, New Orleans, La.; New York University, New York, N. Y.; the boards of education of Detroit, Mich., and Cleveland, Ohio; and the International Council for Exceptional Children, Cincinnati, Ohio. On a state tour arranged in co-operation with the Louisiana Society for Prevention of Blindness, Mrs. Hathaway lectured before various educational, social service and civic groups throughout the state of Louisiana. She has also lectured before a group of school principals regarding eye health in public schools, under the auspices of the Eyesight Conservation Committee of the Brooklyn Health Council; before a group of students from Brooklyn College; and before an audience of public health nurses in Wilkes-Barre, Pa., under the auspices of the Pennsylvania Association for the Blind.

In addition to general staff conferences with a government representative, regarding promotion of sight conservation by the federal government, Lewis H. Carris, managing director, and Mrs. Eleanor Brown Merrill, associate director, conferred with members of the Social Security Board and the United States Public Health Service in Washington, D. C.

Upon the invitation of the Eyesight Conservation Committee of the Brooklyn Health Council, Mrs. Merrill presented the subject

of prevention of blindness to the lunch club conducted by the *Brooklyn Daily Eagle.* This was also the subject of her talk before a student group of the Church Army who are considering eye health in relation to their future work.

The Society's associate in education, Dr. Anette M. Phelan, is on an extensive field trip, participating in programs for integrating eye health in college training in various teacher training centers. In addition to an address given at Vassar College, Dr. Phelan recently attended the conference of the National Education Association in New Orleans and took part in a meeting of the advisory committee on teacher education in eye health.

Mrs. Francia Baird Crocker, R.N., associate for nursing activities, addressed the nursing staff of the board of education in Newark, N. J., and also gave a talk at Teachers College, Columbia University.

The 1936 annual report of the Society, recently published under the title of "Let's See!" describes the various projects of the Society and lists the following accomplishments: 350,000 copies of publications were distributed; the film, "Preventing Blindness and Saving Sight," was shown to 90,000 people; press releases of the Society resulted in 2,445 news articles and editorials in magazines and daily newspapers throughout the country; conventions and county fairs used 121 mounted displays and exhibit sets provided by the Society; staff members of the Society visited 88 cities in 27 states; and 10 radio talks, made by staff members, brought many requests for guidance on eye health problems.

Book Reviews

DISEASES OF THE EYE. Sir John Herbert Parsons, C.B.E., D.Sc., F.R.C.S., F.R.S. New York: The Macmillan Co., Eighth Edition, 1936, 705 p. ill.

This volume, approaching as it does the ideal text for the medical student in ophthalmology, has an even broader usefulness in that it is detailed enough to be used for quick reference when general practice is begun. Any book which reaches an eighth edition, as has this one, has proved its worth.

The reviewer feels it is more satisfactory than certain other books of its class because it outlines the basic features of ocular anatomy and physiology in a very satisfactory way.

The sections dealing with various phases of fundus study are so well illustrated in colors as to be a veritable atlas. Other portions of the book are also well illustrated. The material is very well arranged and presented in a clear, yet concise, diction.

JOHN N. EVANS, M.D.

VOORKOMING VAN BLINDHEID. Prof. J. Van der Hoeve. Leiden: H. E. Stenfert Kroese's Uitgevers-Mij N. V., 1937, 53 p.

Prevention of blindness was the subject of this address, delivered by the Rector Magnificus of the University of Leiden on the 262d anniversary of the founding of the University by the Prince of Orange. It is especially interesting as being a comprehensive survey of preventive measures given by one of the leading ophthalmologists of the world who is, at the same time, a distinguished representative of Dutch medicine and scholarship. It indicates how deep an interest has been developed and how widely it has extended for the prevention of blindness.

Professor Van der Hoeve considers blindness from various aspects, its importance as a social problem and as related to deafness. A definition is given as to what constitutes blindness and something as to the number of blind in the world. He describes the formation of the International Association for Prevention of Blindness and the International Organization Against Trachoma at the

meeting of the International Ophthalmological Congress at Scheveningen in 1929. He discusses congenital blindness; blindness of factory workers; loss of sight from diphtheria and the great decrease under proper measures; and trachoma as manifested in China, Egypt, Palestine and elsewhere. He refers to the work on trachoma, of Jitta, of the League of Nations, as well as that of Professor von Grosz. Professor von Grosz was for five years President of the International Organization Against Trachoma, whose present head is MacCallan, world renowned for his trachoma work in Egypt.

The author refers to the use of optochine as a specific in the pneumococcus of ulcus serpens; he discusses fully diabetes in its effect on the eye and the use of insulin, and refers to the work of Joslyn in this connection. He speaks of xerosis conjunctivae and avitaminosis in keratomalacia, operative work on cataract and cataract caused by naphthalene, and mentions especially the experimental work on swine at the Texas Agricultural Station in which the absence of vitamin A produced blind pigs with anophthalmus. He discusses glaucoma and other forms of preventable blindness. He mentions the moot question of sterilization in the congenitally blind. It is an especially valuable work.

This is a very cursory review of an admirable address which indicates how rapidly the prevention of blindness movement is extending throughout the world.

PARK LEWIS, M.D.

OPHTHALMOLOGY IN GENERAL PRACTICE. O. Gayer Morgan, M.A., F.R.C.S. London: John Bale, Sons & Danielsson, Ltd., 1935, 58 p. ill.

This is a monograph of 58 pages. It is apparently intended to give the general practitioner some idea of the field of ophthalmology and includes an abbreviated description of external diseases, fundus conditions, glaucoma, squint and errors of refraction. Four pages are devoted to the foreword and a description of the instruments required, whereas the subject of squint is dismissed in three pages. Most attention is paid to external diseases and injuries. There are eight black and white plates portraying various internal and external conditions.

It is this reviewer's opinion that books of this sort, with their necessarily meager information, often thwart the purpose of the writer. It is assumed that the author intends to awaken an interest in ophthalmology and to provide a stimulus to further study. Too often, however, the general practitioner is content with "pocket information." The book tries to cover too big a subject in too few pages.

WILLIS S. KNIGHTON, M.D.

Books Received

CARDWELL, M.D., MARY G.: *Some Aspects of Child Hygiene.* 82 p. ill. Sir Isaac Pitman & Sons, Ltd.

HALSTEAD, WARD: *The Effects of Cerebellar Lesions upon the Habituation of Post-Rotational Nystagmus.* 130 p. ill. The Johns Hopkins Press.

LAYMAN, JOHN D.: *The Avian Visual System.* 36 p. ill. The Johns Hopkins Press.

RICH, MARGARET E.: *Current Trends in Social Adjustment Through Individualized Treatment.* 18 p. Family Welfare Association of America.

TURNER, M. A., C. E., and COLLINS, GEORGIE B.: *Community Health* (Revised). 250 p. ill. D. C. Heath and Co.

TURNER, M. A., C. E., and HALLOCK, GRACE T.: *The Voyage of Growing Up* (Revised). 204 p. ill. D. C. Heath and Co.

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

227. The Conquest of Blindness. Flyer on syphilis and sight, urging the reader to join the crusade to help fight syphilis, which is curable.

228. Some Problems Confronting Teachers, Gladys D. Matlock. 12 p. 10 cts. Reprinted from *The Sight-Saving Class Exchange*, Number 59, February, 1937. How to solve certain problems in order to give the whole sight-saving class program balance.

229. Lacks and Gaps in the Sight-Saving Class Program, Elizabeth Dasher. 16 p. 10 cts. Reprinted from *The Sight-Saving Class Exchange*, Number 59, February, 1937. Discussion of the educational philosophy which must be kept in mind by the sight-saving class teacher in order that she may guide the emergence of a well-integrated personality with socially desirable life aims in each of her pupils.

230. What Causes Eyestrain in Children? Willis S. Knighton, M.D. 8 p. 5 cts. A clear and simple explanation of the common causes of eyestrain in children, indicating the importance of periodic examinations and careful treatment.

231. Visual Problems in Education, Lucy V. Ailer, R.N. 12 p. 10 cts. Practical advice based on experience gained as a health supervisor and a county public health nurse.

232. Study Facilities in College Dormitories, John O. Kraehenbuehl, Ph.D. 16 p. 10 cts. An interpretation of a survey which was made of lighting conditions in the dormitory rooms of more than 2300 students; suggestions for improvements are made.

233. Current Trends in Ophthalmology, A. D. Ruedemann, M.D. 12 p. 10 cts. Outlines the progress made and the goal sought in caring for the eye problems of the school child, as well as the advances made in the technique of treatment of the most prevalent eye diseases, hereditary defects and eye injuries.

234. Preparing Student Nurses to Assume Responsibility for Eye Health, Francia Baird Crocker, R.N. 8 p. 5 cts. An outline of the basic principles of eye health which should be studied by the student nurse. It points out the need for variety of experience in hospital and clinic, and closer correlation between theory and care of the patient.

235. What Public Health Nurses Should Know About Hygiene of the Eyes, S. Gertrude Bush, R.N. 12 p. 5 cts. Presented at the Annual

Conference of the National Society for the Prevention of Blindness, Columbus, Ohio, December 4, 1936.

236. What is Wrong With Our Fifty Foot-Candle Installations? Ward Harrison. 20 p. 10 cts. An address reprinted from *The Magazine of Light*, which explains three fundamentals of illumination design that affect the comfort of a general lighting system.

D97. Blindness and Its Causes, C. Edith Kerby. Reprinted from *California & Western Medicine*, January, 1937. 12 p. 10 cts. Presented at the Annual Conference of the National Society for the Prevention of Blindness in Columbus, Ohio, December, 1936, this paper advocates a complete analysis of each case of blindness to the end that each shall have adequate examination and treatment necessary to give maximum possible vision, and an adequate summary of facts concerning all cases of blindness.

D98. The Eyes Have It! Morris D. Keller, M.D. Reprinted from *Hygeia*, February, 1937. 4 p. 5 cts. A popular discussion of the many diseases and defects, both ocular and otherwise, which can be diagnosed from the characteristic appearance of the eye in each case.

D99. An Eye Health Program for All the Children, Winifred Hathaway. 8 p. 5 cts. Reprinted from *Public Health Nursing*, April, 1937. A specialist in eye health shows that the same principles of sight conservation as are employed in sight-saving classes are important for all children.

Contributors to This Issue

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Practical experience guides the pen of **Miss Lucy V. Ailer,** who is the supervisor of health education and visiting teacher for the Galion, Ohio, public schools.

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An expert in the field of medical social service, **Miss Lena R. Waters** is the director of social service at the Hospital of the University of Pennsylvania.

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Mrs. Francia Baird Crocker is associate for nursing activities of the National Society for the Prevention of Blindness.

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Book reviewers: **Dr. John N. Evans,** professor of ophthalmology, Long Island College of Medicine, Brooklyn, N. Y.; **Dr. Park Lewis,** first vice-president of the National Society for the Prevention of Blindness; and **Dr. Knighton.**